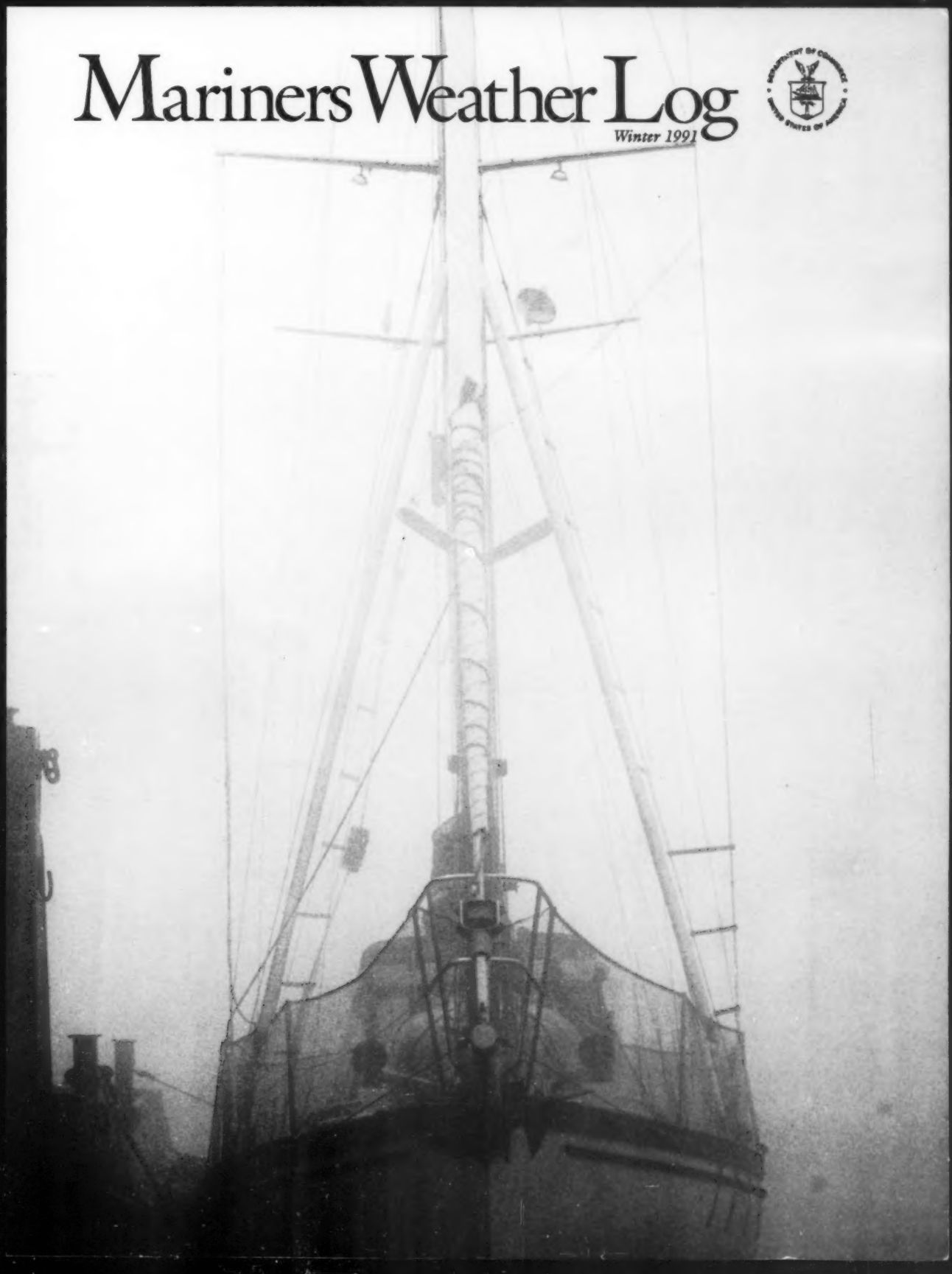
Mariners Weather Log

Winter 1991



Spectacle Reef Light

Lake Huron, Michigan

Pen and ink drawing by Leo Kuschel
Descriptive passage by Leo and Sue Kuschel

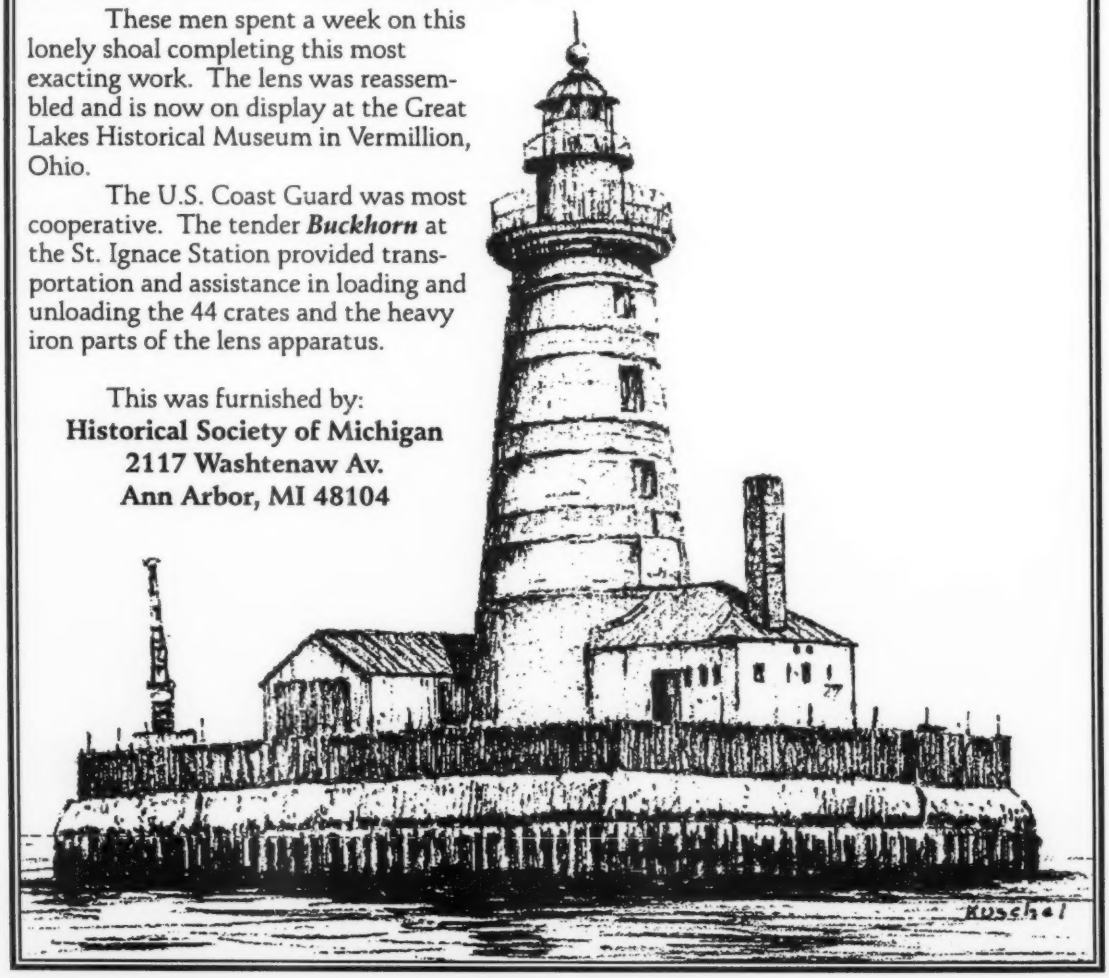
This lighthouse was built on a very dangerous shoal in the northern region of Lake Huron, 10 miles east of the lighthouse on Bois Blanc Island. This light stands 86 feet above water and was first lit on June 1, 1874.

One of the most interesting stories was the removal of the second order Fresnel Lens, which was deemed expendable in 1973 when the light was automated. The Great Lakes Historical Society raised money to remove the lens, the actual work being done by Jim Woodward of the U.S. Coast Guard, Tom Meakin of the Great Lakes Historical Society and Mike Van Hoey of the Great Lakes Lighthouse Keepers Association. A crane was used to raise tools and crating material to the lights gallery. The lens was carefully disassembled and packed in wooden crates, which had been built in the tower's watch room. The crates were then lowered by crane to the platform below.

These men spent a week on this lonely shoal completing this most exacting work. The lens was reassembled and is now on display at the Great Lakes Historical Museum in Vermillion, Ohio.

The U.S. Coast Guard was most cooperative. The tender ***Buckhorn*** at the St. Ignace Station provided transportation and assistance in loading and unloading the 44 crates and the heavy iron parts of the lens apparatus.

This was furnished by:
Historical Society of Michigan
2117 Washtenaw Av.
Ann Arbor, MI 48104



Mariners Weather Log

January, February, and March 1991
Vol. 35, No. 1

Features

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We Fought Cape Horn ...and the Horn Won

Richard Wilson

A first hand account of a dramatic attempt to break the 136–year old record set by the ***Northern Light*** *from San Francisco to Boston via Cape Horn.*

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Who Put the Wind Speeds in Admiral Beaufort's Force Scale?

Dr. Blair Kinsman

Part 2— the new scales. The second part of the Beaufort story involves the evolution of the original scale through the ages.

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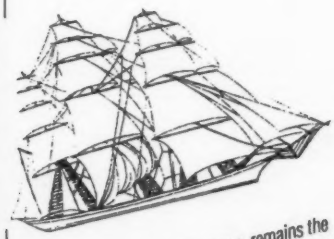
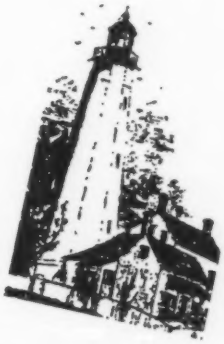
View from Another Bridge

Nigel Calder

A frightening account of sailing the lower Mississippi River and the Gulf of Mexico, while battling the weather and commercial vessels.



The **Northern Light**, above, remains the champ from San Francisco to Boston; the story is on page 4.



To the right is the Sandy Hook Lighthouse, covered by E. DeWire on page 26.

Cover: *Nigel Calder's Nada is tied up in fog on the lower Missisippi River in January of 1989, as a supertanker looms in the background. Photo by Nigel Calder.*

Back Cover: *Beaufort's early training included the battle of the "Glorious First of June" in 1794. Here the H.M.S.* ***Brunswick*** *engages the French* ***L' Achille*** *and* ***le Vengeur****. These were the types of vessels for which his scale was designed. National Maritime Museum, Greenwich.*

The Beaufort scale was revised many times. This humorous attempt was done in 1906— Page 12.

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Billed as the Great American vs the Northern Light, it was in reality two daring sailors battling the elements, from tropical Pacific hurricanes to circumpolar lows of the Whistling Fifties.

We Fought Cape Horn

"You've learned the signs for shifts of wind– the slight clearing in the southwestern sky, a movement in rising cloud, then the swift sudden shift. Its the same off the Horn, except the wind is madder there, the shifts faster, nights longer, seas higher, ice nearer...you get no sleep. You'll get so wet so long your skin will come off with your socks, if you get time to take them off. But with luck you'll get past Cape Horn and, by the grace of God, you won't kill anybody."

Captain James Cook from
The War With Cape Horn
by Alan Villiers

We were 5 days ahead of the Northern Light's 136–year old record, when we ran into a Southern Ocean Low. Approaching Cape Horn in our trimaran, the ***Great American***, we had been battling rough weather for 5 days. The pounding worsened on Thanksgiving Day (November 22, 1990). Suddenly a huge wave dipped the bow. We started sliding down what seemed like a bottomless pit and then our world turned upside down and filled with the cold water of the Southern Ocean. Although stunned, we didn't panic. We pulled out the emergency radio beacon, turned it on. Survival became foremost, but we knew that our dream had ended.

...and the Horn Won

Richard Wilson

The Great American (right) was 60 feet long, 40 feet wide and had a displacement of 5.4 tons compared to the Northern Light, which was 171 feet long, 36 feet wide and a displacement of 1,021 tons.

Across the page, is a visual satellite photograph of the storm that proved too much for the Great American. The time of the shot is about 2000 UTC on the 22d of November 1990, close to the time that things got rough.

In late October of 1990 Steve Pettengill and myself set out to tackle the old sailing speed record from San Francisco to Boston around the legendary Cape Horn. The record is held by the clipper ship ***Northern Light***, which made the passage in 76 days and 5 hours during a race in 1853.

The story actually begins with the California Gold Rush, which turned San Francisco from a sleepy trading post of 200 people to a bustling, lawless seaport in 1849. From April 1847 to April 1848 just two ships had visited San Francisco harbor. In 1849, some 775 vessels left Atlantic ports for San Francisco, and 91,405 passengers landed at the port from various parts of the world. Officers and crews often hurried to the mines, leaving the ships behind. Many of these ships were turned into stores, hotels, hospitals and even prisons. Prior to 1848, California had been practically uninhabited and now was unable to provide for the needs of this booming population. Many newcomers with plenty of gold were on the brink of starvation. The need for goods and the demand by passengers to get there in a hurry gave rise to the California clipper. One hundred and sixty of these vessels were built from 1850 to 1854. Most of them were launched at or near New York or Boston. These magnificent sailing ships, the fastest the world has ever seen, sailed for the sake of commercial ocean supremacy and set speed records that still stand today for sailing vessels. In fact, it was years before the steam-powered vessels could break them.

The first contest of clippers around the Horn took place in 1850 between seven vessels, and large sums of money were wagered on the outcome. The ***Sammuel Russell*** arrived at San Francisco in 109 days from New York, knocking 11 days off the previous record. It was felt that this record would not be topped, but only a short time later, another contestant, the ***Sea Witch*** blew in just 97 days after leaving Sandy Hook, reducing the record by another 12 days. This passage astonished everyone and has not been equalled by a ship of her tonnage since. This performance was made more remarkable by the fact that she rounded Cape Horn in midwinter. The records indicate that about the time she left New York, vessels, in general, were averaging 159 days to San Francisco from New York and Boston.

In February 1853, three first–class clipper ships were in San Francisco Harbor; all were due to leave for the coast of New England at about the same time. Two of the ships, ***Contest*** and ***Trade Wind***, had been built in New York, while the third ship, ***Northern Light***, had been built in Boston. There was great

Hart Nautical Collection MIT Museum

On October 25th at about 1800 UTC the satellite caught Hurricanes Trudy (far left) and Vance off Baja California (right). These two storms posed a significant threat to the voyage. At its peak it was estimated that Trudy generated 135– knot winds around a 925–mb pressure— one of the most intense in recent history in this region. Socorro Island reported gusts to 112 knots. Vance became a hurricane on the 25th and peak winds reached 87 knots the following day.

The Northern Light (below,left) made the run from San Francisco to Cape Horn in 38 days, and was off Rio de Janiero in 52 days. According to one account, captain Hatch came on deck as his ship was rounding the Horn and, sailing very close to the Contest, he signalled that he could no longer sail in company with the other vessel for he "couldn't hold his horse." In 1854 the Comet, which lost this race, made the trip from San Francisco to New york in just 76 days.

Satellite Data Services Division

discussion of the ships' merits and it was decided they would compete in an impromptu race.

Captain Freeman Hatch on the ***Northern Light*** set sail from San Francisco on March 13, 1853. She arrived at Boston Light on the 29th of May 1853, having made the passage in 76 days and 5 hours. The ***Contest*** arrived in New York in 79 days and it was reported that the ***Trade Wind*** took 84 days to reach New York. ***Northern Light*** sailed 355 miles on her best day's run. To this day no sailing vessel has made a faster trip from San Francisco to Boston via Cape Horn. We decided to try.

The ***Great American*** was a trimaran designed by John Shuttleworth and built in Devon, England by Peter Phillips. The boat was launched in 1982 and was capable of sailing at 22 knots in favorable wind and sea conditions. The hulls were built of foam sandwich reinforced with fiberglass and kevlar inside and out. Carbon fiber strengthened the crossbeams and bulkheads. This boat had one mast and could have three sails raised at one time. The vessel was outfitted with an ARGOS satellite communications system and we got our weather from Bob Rice at Weather Services Corporation in Bedford, MA, along with weather facsimile transmissions from San Francisco, Pearl Harbor, Honolulu and Buenos Aires, enroute.

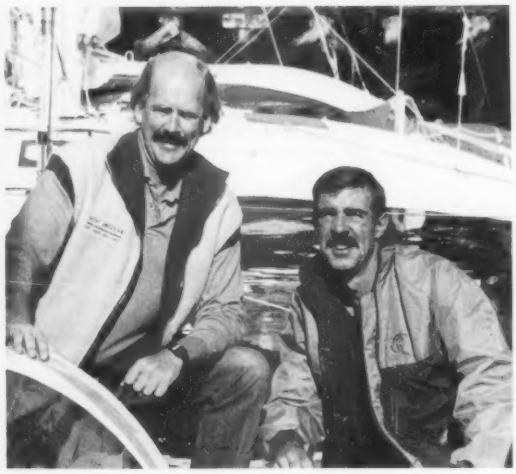
We left San Francisco on the 22d of October, with a flying start due to good winds and weather. The first few days were anxious because of powerful Hurricane Trudy, which was heading westward from the Mexican coast as we headed southward. This was followed by a second hurricane, Vance. These storms moved slowly and we were able to move around the front–runner, Trudy, to the west and use its counterclockwise winds to our advantage. It did, however, put us farther west than we wanted. The next several days we had a mix of good weather, some heavy seas and squalls and some flat calms.

Toward the end of October we were slowed a little by the Intertropical Convergence Zone (ITCZ). This enabled the Northern Light to catch and pass us, historically speaking, but by Day 12 we were gaining ground. On Sunday, November 4, 1990 (Day 13), we crossed the equator and entered the Southern Hemisphere. We had a little celebration in the morning, with a glass of champagne to toast King Neptune. Winds were out of the south southeast at 11 knots and we were pounding into 8–to 10–foot seas. We had made up 60 miles on the ***Northern Light*** in the past 24 hours and were then only 50 miles behind her.

By the 6th, we had put 230 miles between us and the ***Northern Light***, which had had a great day's run but in a southwesterly direction. We also monitored a Low some 1500 miles to the south. It was not too early to start keeping an eye on it.

By Friday (the 16th) we had broken away from the light winds of a South Pacific High and entered the influence of that sprawling Low. Within about an hour we could feel the difference in the air, which was now being brought up from the Antarctic instead of down from the tropics. Winds were 25 knots with seas of 15 to 20 feet. The weather facsimile map and 5–day forecast indicated a moderate low pressure system with winds possibly reaching 50 knots by the 20th. Through the weekend, winds increased to 40 knots, while seas gradually built to

The Great American Crew



Skipper Richard (Richie Wilson) is a native Bostonian who has sailed since he was 3 years old. In 1980, he became the youngest winning skipper of the Newport to Bermuda Yacht Race, and in 1988 he raced 3,000 miles upwind and alone across the Atlantic in his little trimaran, Curtana, and won his class.

Despite severe asthma, Richie has run the Boston marathon four times and he plays softball. In recognition of his athletic achievements, the American Lung Association named him a Super Achiever in 1990.

Co–skipper Steve Pettengill is a native of Michigan who now lives in Rhode Island. Steve has more than 30 years of sailing experience. He has competed in the OSTAR, a single–handed race from Plymouth, England to Newport Rhode Island. Steve was the second crew member on the ***Great American*** during her record–breaking 77–day voyage from New York to San Francisco in 1989. In 1986 he was named Sportsman of the Year in Grand Rapids, MI.

40 feet, fully manageable with the right sail combination and steering angle to the sea.

Monday and Tuesday brought us to a second level of weather intensity. The wind increased to 50 knots. We responded by reducing sail from two reefs in the main to three reefs, then to four reefs, and then no mainsail at all and two–thirds of the stay sail rolled out for front wheel drive and no genoa. We started dragging ropes— first three then two more with knots, finally eight in total, all with knots. After number six, we were still surging between 9 and 16 knots, with number seven and eight we reached a critical drag, our speed stabilized between 9 and 10 knots— perfect because we had enough speed to steer decisively, yet enough drag to prevent surfing out of control down the waves. The ***Great American*** was on course for our waypoint, some 60 miles south of Cape Horn.

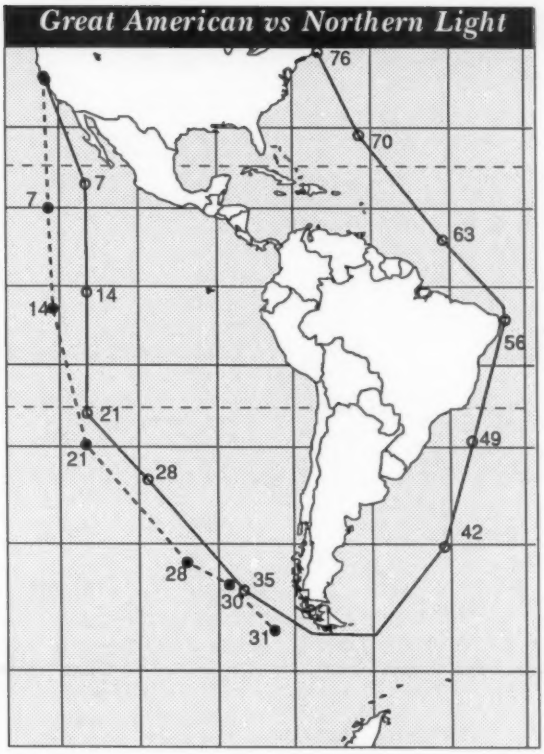
By late Tuesday, the winds had built the seas to 40 feet— clearly a dangerous size for the boat and frightening to us. The barograph, which had dropped gradually, now began to drop in earnest. Our latest weather facsimile maps still gave indication of only a moderate Low and frontal system, so we actually looked for the barograph to start rising. It did not. The weather continued to deteriorate through Tuesday night. We got sideways to a wave and I got thrown out of my bunk, landing 5 feet below. On watch an hour later, I pulled up the centerboard to give the boat less to *trip on* if we got sideways again.

On Wednesday afternoon we centered the boom to give the wind no asymmetry to grip. We sailed with no sails and 12 knotted lines over the stern at 9 to 10 knots. The barograph descended at a 45 degree angle, the wind increased to 70 knots. Huge 50–foot waves formed, with crests adding another 10 to 15 feet. Wave after wave charged at us relentlessly. In a late afternoon ham conversation, we described our barograph as heading off the chart— our best attempt at humor. We were tense, but tried to keep our spirits up and rest as much as possible. We had on our warmest clothing.

Wednesday night the situation got decidedly worse. It was a nightmare. You could hear the wind howling and the water crashing and see splotches of light where the seas were cresting— everything else was black. Thursday morning the air temperature was 40°F, and with a 70–knot wind this made for a windchill of 8°F. A sleet squall went through. Then a wave broke over the two stern pulpit–mounted wind chargers, stripping one of all its blades and the other its bolted–on tails. The powerful trim tabs became unpinned from the rudder and threatened to randomly take over the steering. Steve went out and re–pinned them, but his numb hands prevented him from tying the pins in. I went to finish the job returning after 3 minutes, draped over the stern with stiff fingers.

I logged our position and reviewed the weather facsimile maps. They didn't show anything like this. The barograph trace was flat–lined on the bottom of the drum, below 28.5 inches (965 millibars) for the past 6 hours.

Suddenly there was a huge wave. We slid down it sideways and began to heel precipitously as the wave face became steeper and steeper. We heeled farther then ever before, then farther still, and



The approximate track of the Northern Light and Great American are shown at left. The figure represents the number of days out of San Francisco and the last position of the Great American is about where the U.S. Coast Guard picked up the ARGOS signal.

then past the point of no return and she was over.

At this point she was capsized with the mast straight down in the water. Although stunned we kept calm. The water was knee–deep on the main cabin ceiling. Underneath the cockpit was the only dry spot where we could sit and put on our survival suits. We quickly pulled out the Emergency Position Indicator Radio Beacon (EPIRB) and turned it on. The strobe light was flashing, we hoped the signal was good. We carefully watched the water level in the main cabin and it seemed to be holding steady.

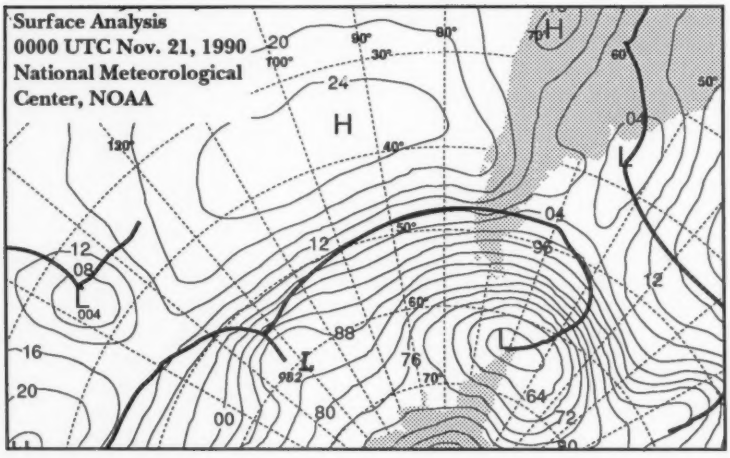
Looking out the escape hatch in the topsides, we could see the starboard float and crossbeam riding high. We organized a dive for the ARGOS, which was clamped to the stern deck. We thought there would be air in there. With a rope attached, Steve swam out to check, but there was only water. We thought about trying the escape hatch, however, the seas were so huge that it seemed too great a risk. The boat was being knocked about, but was reasonably steady considering the circumstances.

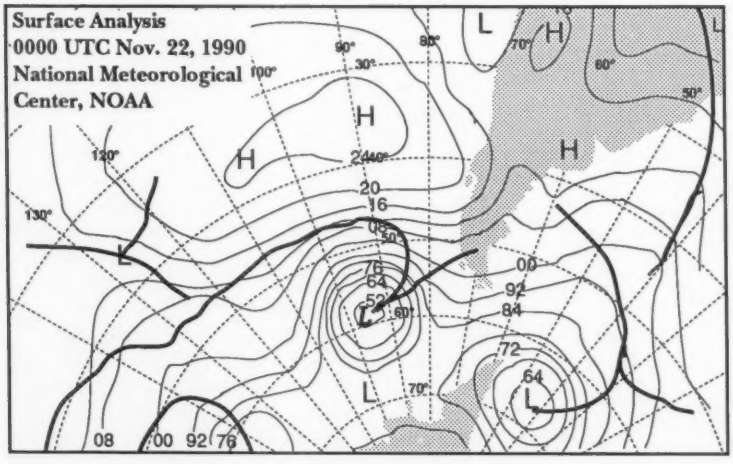
About an hour after capsizing, out of nowhere, came what must have been a monstrous wave. It wrenched the boat out of the water and slammed us violently down and right–side up again. Thrown on my head I was submerged not knowing which way was up. I finally burst to the surface and heard Steve yelling for me. The power of that wave was unimaginable, but miraculously neither of us was hurt.

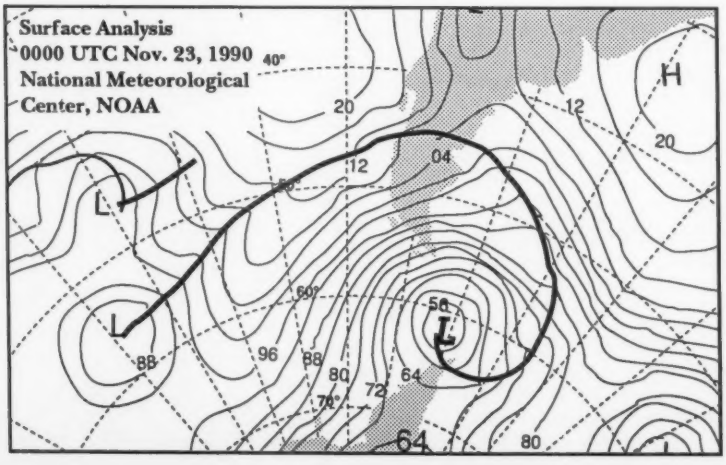
The wave not only spun the 60– by 40–foot trimaran at at least two to three times the rotational speed of the wave that first capsized us, but shattered the mast in addition. The mast, which had been acting as a 75-foot deep centerboard, now lay draped across the aft starboard crossbeam and descended from there into the water. This extra 1500 pounds of the mast pressed the stern down and acted as a drogue to keep the stern to the seas. The seas now broke right into the cockpit, burst through the companionway and surged into the wheelhouse; the length of the main cabin was now neck deep in water. Everything had broken free down below. The plus was that we could now retrieve the ARGOS and our liferaft. The minus was that there was no place for us to get out of the water. The aft part of the boat was filled and the stern deck was underwater. We were 400 miles west of Cape Horn on a little used trade route— maybe one ship every 10 days. The *Great American* had a water–tight bulkhead at the mast dividing the boat into two halves— forward and aft. Our only chance was to move forward to the sail locker, hope that it could be made habitable and set up camp there. In relays we moved the ARGOS, EPIRB, flares and lifejackets forward to the storage compartment. The bulkhead flexed with every wave, but we gained confidence that it would hold. We had a can of ham and Wasa bread for Thanksgiving dinner. The ARGOS was lashed on deck, the EPIRB strobe was blinking, it was dark and we tried to make ourselves comfortable enough to sleep.

We had 7 weeks of food left, 6 gallons of fresh water reserves, a spare desalinator and certain confidence that this strong trimaran was not going to sink underneath us. We still had 10 intact watertight compartments and no lead keel. Our survival issue was going to be hypothermia.

Unbeknownst to us, at 1605 UTC on the 22d, the Coast Guard received a message from Bob Rice, who had picked up the ARGOS signal. Through Valparaiso, Chile, the







These copies of the National Meteorological Center's Surface Analysis Charts tell the story. The upper air discussion from NMC mentions that the flow aloft is very fast and zonal, resulting in a rapid movement of weather systems. By the 21st, a Low, from the Bellingshausen Sea that was causing some problems on the 20th, is now at 959 mb over the Antarctic Peninsula, and trails a front along the 48th parallel, and into a harmless–looking 982–mb system far to the west. The front is causing rough weather for the Great American, but the explosive development of the 982–mb system seems to be the real culprit. Look what happens to this system in just 24 hours. It deepens to an estimated 949–mb pressure and moves more than 800 nautical miles— a speed of about 30 knots, to a position southwest of the Great American. That type of development along with rapid movement is one factor often mentioned in the development of phenomenal seas and even freak waves. At 0000 UTC on the 22d a report came in from the New Zealand Pacific (55.8° S, 92.1° W) of 60–kn west northwesterlies, 20–ft swells and a 964–mb pressure. By 0000 UTC on the 23d, the Low is still potent; this is near the time of the disaster.

New Zealand Pacific was contacted, being the nearest vessel in the area (58°53'S, 081°30'W). By 1630 they were on their way. The Coast Guard's AMVER continued to track the ARGOS beacon. At 2153 the ***New Zealand Pacific*** was about an hour away and already running into force 9 winds.

Steve was able to get some sleep. I planned how we would cut away the rig in the morning. About 2 a.m. I heard a new sound— a low groan — maybe the sound of the aluminum mast tearing underwater. After a few seconds it dawned on me that tearing aluminum couldn't be that steady. I woke up Steve and opened the hatch. A quarter–mile off the starboard beam were the lights of a ship. I waved my arms in their spotlight and then shone our flashlight at them. They began to back off and we figured they hadn't seen us. Quickly we pulled out a flare, but couldn't read the Norwegian instructions. We followed the dia-

gram and soon had it burning. The ship powered forward and turned. I could see the boxes on the stern—a huge container ship. We had no way to communicate, but whatever they were going to do we had to be ready.

Any transfer from a small boat to a large ship is dicey business at best. In 40–to 50–foot seas and force 12 winds it was flat out dangerous. The ship combined a drive to windward with a wind-driven drift to leeward and made its way toward us. A light appeared on the black side of the vessel, a port had been opened. The ship's name ***New Zealand Pacific*** was lit up. Knowing that nation's great seafaring skills, our confidence was boosted. It was now clear that this huge container ship was coming alongside in 40–foot seas. Quickly the ship was next to us and two lines flew across the main hull. A voice shouted for us to tie a bowline around ourselves. I grabbed one and Steve the other. We tied the bowlines and clambered over the broken boom across the netting to the float just as the massive side of the ship kissed the float— perfectly parallel and with the door centered between our two crossbeams. The ***Great American*** rose on another huge wave and delivered us to the side of the ship. At the peak, we both jumped— I for the ladder and Steve for the netting. We both got a foothold and began to climb. Helping hands got us into the door. I turned to look as the trimaran, down by the stern, but with her bow held proudly high, slipped slowly down the side of the ship into the darkness.

The ***New Zealand Pacific*** had arrived in the vicinity around 0000 UTC on the 23d. Some of her containers on the stern were stove in by seas that were estimated by the Captain at up to 65 feet. By 0141 a message was sent to the Coast Guard that they had two men and both were doing fine and we will drop them off in Holland on the 10th. Vessel and beacon remained adrift.

That this 815–foot, 42,000–ton container ship, was able to maneuver alongside our trimaran, while experiencing a 35° roll, was a remarkable piece of seamanship.

The 18 days aboard the ***New Zealand Pacific*** were an education and a privilege for us. We learned a lot about merchant shipping and made 36 new friends. We were surprised to learn that some of the crew had thought that Cape Horn weather was overrated. They felt that up to this time they had seen rougher conditions in the Tasman Sea and Bay of Biscay. They admitted that this voyage had changed their minds. We left the ship in Vlissingen, Holland and flew home to Boston the following day.

The textbook rescue, by Captain Watt and his crew, proved that the international search and rescue system works. That it worked in those appalling conditions off Cape Horn is testimony to the proper and reliable equipment, seamanship and level heads of the participants. We thank all who were involved.

Student Ocean Challenge

Current information for this adventure was being provided through Student Ocean Challenge program. The Student Ocean Challenge (SOC) is an independent classroom–based educational program for grades Kindergarten through Twelve. It offers an opportunity for school kids to learn about the oceans, world cultures, geography, history and our global environment through a multi–disciplinary study of contemporary ocean voyages and expeditions. The classroom becomes a hands–on learning center where students track the routes of voyagers and explorers in real time, while they learn the skills of problem solving, teamwork and the challenge of setting and achieving goals.

The SOC pilot program began in 1982–83 in Newport, RI, in conjunction with the first BOC Challenge, a single–handed round–the–world yacht race. Throughout the second BOC Challenge, the SOC reached 20,000 school children in more than 300 schools in the United States, Canada, Europe, South Africa, Australia and Brazil. With the assistance of the race sponsor, The BOC Group, SOC provided information and materials to classroom participants worldwide.

Other events that have been covered include, the International Trans–Antarctica Expedition, which enabled school children to follow a daring dog sled trek, the Cape Horn Clipper Challenge from New York to San Francisco, the Route of Discovery Yacht Race from Puerto Sherry, Spain to Santo Domingo and the voyage of the U.S. Coast Guard barque Eagle from New London, CT to Australia. Upcoming events will include The Christopher Columbus Quincentenary Jubilee. More information about this program can be had by contacting its founder anddirector, Mame Reynolds at:

Student Ocean Challenge
P.O Box 1209
Newport, RI 02840

Who Put the Wind Speeds in Admiral Beaufort's Force Scale? Part 2— the new scales

— Blair Kinsman

National Maritime Museum Greenwich

The French 74–gun ***Droits de l'Homme****, is driven ashore by the frigates* ***Indefatigable*** *(44–gun) and* ***Amazon*** *(36–gun) in January 1797. This is what is meant by* ***in chase****.*

You may wonder how reproducible Beaufort's scale was and even why anyone should want such a scale. If it were a wind speed scale, which it most emphatically is not, reproducibility would be most difficult. The mean wind speed varies with the length of time over which the mean is taken and, more importantly, with the height above water. The wind direction changes with height too. It is quite possible for the wind speed to be 7 knots for an officer on the quarterdeck, while it could be double that for a lookout perched on the crosstrees 120 feet above the deck.

If you want a mean wind speed scale you'll have to specify the exact height above sea surface at which you want the wind speed to be measured. Taking measurements at a specified height above mean sea level with something as wiggly as the sea surface is a problem all to itself. If the officer and the lookout had anemometers, they would measure quite different wind speeds but they would come up with the same Beaufort number for the wind force, because they look at the ship—which is the same for both—and only indirectly at the wind. What matters is the practical problem of how the ship behaves. Men who know a ship seldom disagree about that.

Taking measurements at a specified height above mean sea level with something as wiggly as the sea surface is a problem all to itself.

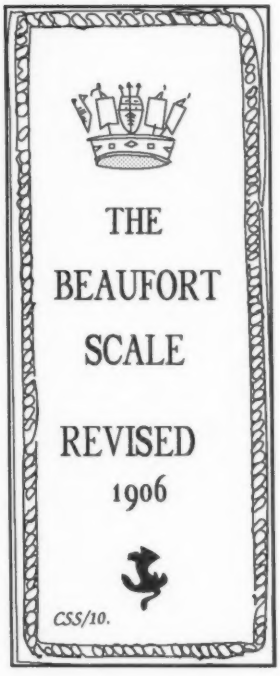
Even if you concede the uniformity of judgment of men used to frigates, you may wonder if it would remain uniform for a 74. The answer is that while there would be differences between hulls and rigs, a 44–gun frigate was about *average* in sail carrying power. There was really no trouble in applying Beaufort numbers to other ships. Almost every officer had served in, and had often commanded, frigates. Whether in a ship–of–the–line, or a grog shop ashore, he could still judge accurately what sail he would carry in chase if he were commanding a frigate.

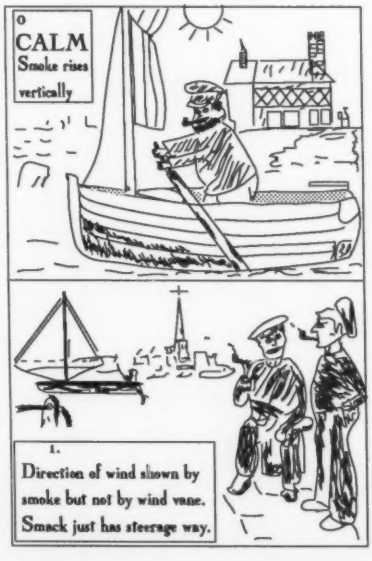
In Part 1 Dr. Kinsman described Beaufort's early seafaring life, which led him to develop the Beaufort scale, along with a description of the scale and how it was used. Part 2 discusses the evolution and misuse of the scale. This article originally appeared in Oceans magazine, August 1969, Vol. 2, No. 2. It is with the kind permission of Mrs. Blair (Dorothy) Kinsman that we are able to present this wonderful article by her late husband.

In modern jargon the frigate of 1805 may be thought of as a probe for measuring wind force and Beaufort's scale as the set of index numbers for the quantized states of the ship. I suspect that Beaufort would feel we were perverse to put it that way. Admittedly, turning a frigate into a *probe* implies some peculiar and poorly defined statistical weighting functions. Further, a frigate occupies a lot of space. Its time scales are long too. You don't furl sail or change tacks in seconds. A French officer captured during the *Glorious First of June* was amazed that the British were able to tack ship in 5 minutes. The French could seldom do it in less than 15. For comparison, a racing dinghy can complete the same evolution in 3 to 5 seconds.

At large today are a number of versions of something bearing Beaufort's name. They all have the family nose—the integers from 0 to 12 labeled *Beaufort numbers...*

History and the phrase *in chase* clinch the arguments for the uniform application of Beaufort's scale. In 1805 Britain had been at war with France and, indeed, intermittently with all Europe for 12 years. She was to be at war with France for another decade with only brief pauses. Her fleet was at sea almost continuously blockading a continent: she supplied her ships at sea and even her great captains like Nelson remained afloat without setting foot on land for 2 or 3 years at a stretch. Obviously, these were experienced seamen. On the beach, at half-pay, were qualified officers eating their hearts out for a command. British ships were always too few, and their French opponents were often inherently faster and handier. England's only hope lay in fighting her ships to the limits of the impossible.





The fine adjust on the *probe*– the real kicker – was the phrase *in chase*. *In chase* is a racing situation that forces a very fine judgment. I know personally that there is a vast difference in the way I crack on sail when I race and what I will carry when I cruise. A captain could fail to bring a chase to action in two ways. He could fail to carry every rag his ship could stand, or he could spread too much and carry away spars and rigging. In either case the enemy disappeared over the horizon.

The trouble is that we don't know whether the old and the new specifications are equivalent.

For encouragement courts–martial were provided. Blow out your sticks, and you trade places with one of the officers on the beach. Fail to press the chase, and you are court–martialed and dismissed from the service in disgrace. The log entries of wind force and weather were material evidence for the courts, and a uniform scale such as Beaufort's made both log–keeping and courts–martial easier. The Beaufort wind force scale is really a very pretty thing and admirably suited to the job the admiral intended it to do.

At large today are a number of versions of something bearing Beaufort's name. They all have the family nose—the integers from 0 to 12 labeled *Beaufort numbers*—although one, at least, has developed megalomania and runs from 0 to 17. The list of common names for the wind, somewhat altered, is there too. The specifications have changed but not beyond all recognition. Beaufort gave us something to look at; a *well–conditioned man–of–war*. This modern version gives us something to look at too— the changing appearance of the sea surface under the action of the wind.

I suppose the replacement

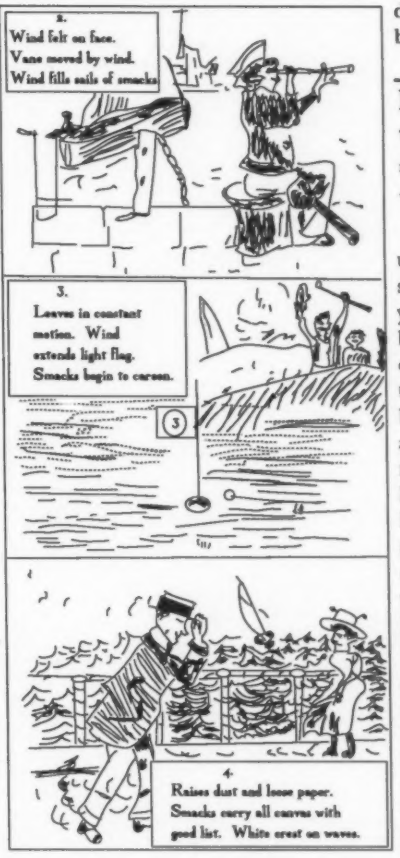
was inevitable. There are very few of His Britannic Majesty's frigates of 1805 still around. Still, it is curious that the final decree divorcing the Beaufort numbers from the frigate was issued as recently as 1941. Sailors are archconservatives, and only the necessity of turning ploughboys into seamen in 90 days, it seems, could have driven them to so drastic a change.

The trouble is that we don't know whether the old and the new specifications are equivalent. Beaufort's scale is quite definite and goes by jumps; a topsail is either single–reefed or it is not. The post– 1941 version is not clear–cut since the sea's appearance changes by imperceptible degrees as the wind gets up. Worse, it doesn't always look the same for the wind. At night you can't even see it.

We would have to build at least two replicas, arm them and let them shoot it out.

The list of odds and ends that can change the appearance of the sea surface seems interminable. When the wind increases, wave growth always lags. The fetch (extent of water over which the wind blows), the depth, the presence of swell, heavy rain, and tidal currents all change the way the sea surface looks. Even biology makes trouble since water in plankton–rich areas foams more easily.

The contrast with the old specification is striking. Dr. Simpson of the Meteorological Office, London, wrote in 1926: "The Beaufort scale defines the strength of the wind by the effect it has on a specified ship under specified conditions of sailing...There is no ambiguity about this: force 8 is almost as definite a physical quantity as 8 kilograms. If necessary a well conditioned man–of–war can be used to check a Beaufort estimate in the same way as a standard weight can be used to check the weight of a body."


2.
Wind felt on face.
Vane moved by wind.
Wind fills sails of smacks
3.
Leaves in constant motion. Wind extends light flag.
Smacks begin to careen.
3
4.
Raises dust and loose paper.
Smacks carry all canvas with good list. White crest on waves.

We have never tried Simpson's suggestion, so the relation between the specifications remains indirect and tenuous.

We need to extend the idea a bit anyway before we set about the job. Since Simpson's version of Beaufort's scale omits the *in chase*, we would have to do more than build a replica of ***H.M.S. Woolwich.*** We would have to build at least two replicas, arm them, and let them shoot it out. It would probably help to hang the captain of the losing frigate should he survive. Scientific determination of Beaufort force numbers might well become a new international sport, combining the best features of an America's Cup defense, a Roman gladiatorial combat, and a lynching.

In one sense the story is a tale of the triumph of technology over rational thought.

It is a wonder that a museum piece like Beaufort's scale should be apparently alive after 185 years. Special scales are always being suggested— Beaufort's was only one among dozens— and their life spans are ordinarily as brief as mayflies'. What happened after 1838, when the Royal Navy made Beaufort's scale mandatory, helps to explain its incredible longevity. In one sense the story is a tale of the triumph of technology over rational thought. It begins with a couple of gadgets. In 1837 Morse demonstrated the first practical electromagnetic telegraph, and in 1846 Robinson invented the cup anemometer. However, neither of these engineering exercises would have delayed the decent superannuation of the Beaufort scale without the intervention of catastrophe.

In 1854 the French and British armies besieged Sevastopol. On November 14, the fleet carrying almost all their winter supplies was at anchor in the harbor of Balaclava. English historian Alexander Kinglake, writing the late nineteenth century, tells us what happened: "over the open downs on Chersonese...there swept on the 14th November a violent hurricane..followed, before the day ended, by driving snow... Of the French shipping, one man–of–war...one dispatch–boat, and several supply–vessels and transports were lost; but it was on the English supply–ships...that the disasters fell most heavily...no fewer than twenty–one were dashed to pieces and totally wrecked, with grievous loss of life, while eight besides were dismasted. The *Retri-*

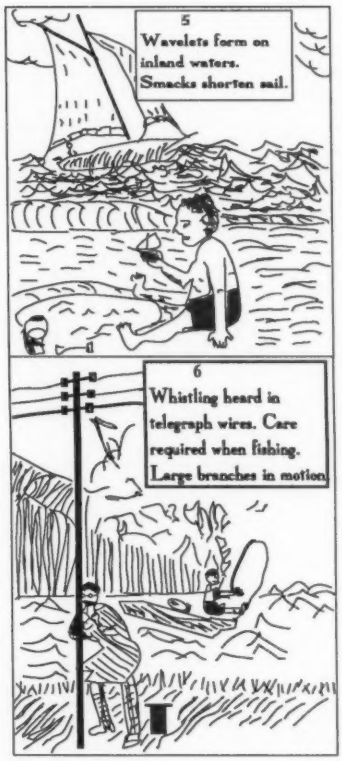
bution ...had her rudder unshipped, lost two of her anchors, and was long in extreme peril. Indeed, it was at the cost of throwing overboard his upper–deck guns that Captain Drummond proved able to save her. Even in the little land–locked pool of Balaclava, the shipping there huddled was grasped, as it were, and confounded and rudely battered together, by the whirling tornado; whilst, moreover, the captain of vessels which had been lying outside, seized the one hope of saving their crafts which seemed to be left to them, and lawlessly drove their way in, carrying yet more confusion and havoc into a crashing thicket of bulwarks, and masts, and spars."

In 12 hours the French and English navies sustained a disaster whose losses exceeded the most savage fleet action ever fought.

Within a year the team reported that fluctuations in barometric pressure associated with storms appear to travel like waves...

Ships cost money, and governments don't like to spend it. Napoleon III called in the astronomer Leverrier, then president of the Academy of Sciences at Paris and fresh from his triumphant discovery of Neptune. The emperor said, in effect, "Don't just stand there. Do something." So Leverrier put together a research team.

For years Leverrier had been corresponding with European observatories about "seeing conditions." Among the data exchanged were records of barometric pressure. Within a year the team reported that fluctuations in barometric pressure associated with storms appear to travel like waves and that, if observers could assemble pressure information fast enough, they might be able to do something in the way of forecasts and storm warnings.


5
Wavelets form on inland waters. Smacks shorten sail.
6
Whistling heard in telegraph wires. Care required when fishing. Large branches in motion.

Twenty years earlier the idea would have died right there, except for a few scientists who would have gone laboriously on gathering data and grinding out hindcasts for the archives. Instead, the suggestion just happened to coincide with the completion of the first reasonably extensive electromagnetic telegraph system spanning much of Europe. The English government didn't like its losses one whit better than did Napoleon III; so the British Admiralty and the French Marine jointly sponsored a weather net—the ancestor of the World Meteorological Organization —to provide storm warnings.

And here is where Beaufort's wind force scale began its protean growth. You know how it goes if you've ever done contract research; you may like meters but, if the agency that foots the bills likes fathoms, fathoms is what they get in the final report. Maybe meters per second or even knots would have been better, but the Royal Navy used Beaufort numbers. The Royal Navy was the training ground for the British merchant marine, and the British merchant marine for the rest of Europe. The forecasts were intended for maritime use so Beaufort numbers were adopted. At any rate, the numbers made a reasonable telegraphic code.

The meteorologists were in a ferment over the possibilities of the new weather net, and as fast as stations were established they were equipped with cup anemometers for measuring wind speeds. The meteorologists seem to have been having a love affair with Robinson's anemometer just the way we all do with a new instrument— at least until we find out from experience what its problems are.

By 1900 total confusion had been achieved... it was no longer clear just what the old force scale meant...

For telegraphic transmission the measured wind speeds were coded in Beaufort numbers, and here the confusion began. In the Ukraine a peasant who had never seen the ocean, let alone a frigate of 1805, read 37 revolutions per minute on his anemometer and, after looking up the equivalent in the tattered table taped to the wall, sent Beaufort 7. His confrère up in Karelia, who had never seen the ocean either, looked up 37 rpm on his table and sent it as Beaufort 5. Even a suspicion of something like this can ruin a meteorologist's whole day.

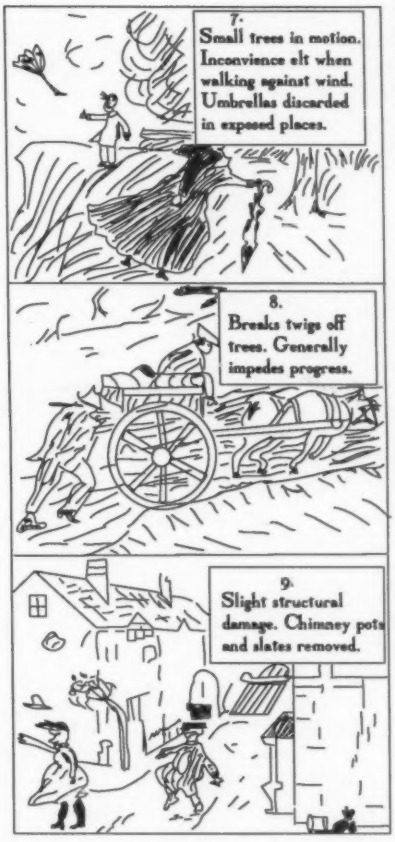
Beaufort never intended his numbers as a code for measured wind speed. We had better distinguish this application from Beaufort's scale by calling it an abstract Beaufort scale. So long as we're all

consistent it doesn't matter whether the abstract scale has any relation to the old force numbers. The difficulty is that the weather net had holes over the oceans. In order to piece in something – anything – to fill the gaps, the meteorologists had to fall back on Beaufort estimates made aboard ships at sea. When you mix abstract Beaufort numbers and Beaufort estimates in your arithmetic, you had better see to it that both are talking about the same thing.

By 1900 total confusion had been achieved. On one hand, it was no longer clear just what the old force scale meant, since few men survived who were competent to judge what the behavior of a frigate of 1805 would be *in chase;* on the other hand, there were more than 30 sets of wind speed equivalents for the abstract Beaufort scale, and they often disagreed among themselves by more than 100 percent. The situation had become intolerable.

...there was a lingering conviction of sin— it ought somehow to be related to Beaufort's force scale.

In 1912 the International Commission for Weather Telegraphy sought some agreement on velocity equivalents for the Beaufort scale. A sub–commission quickly identified two sets of equivalents, one by the Deutches Seewarte (German Naval Observatory), the other by the London Meteorological Office, as the only ones deserving serious consideration. World War I interrupted international amity before the sub–commission could satisfactorily reconcile the equivalents; in 1921 Dr. Simpson was asked to try his hand. The International Meteorological Committee accepted his version of the equivalents for the abstract Beaufort scale in 1926 and revised them slightly in 1946.

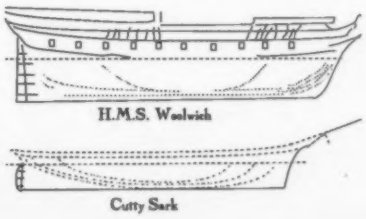

7.
Small trees in motion. Inconvience elt when walking against wind. Umbrellas discarded in exposed places.
8.
Breaks twigs off trees. Generally impedes progress.
9.
Slight structural damage. Chimney pots and slates removed.

Even though the abstract scale had won, there was a lingering conviction of sin— it ought somehow to be related to Beaufort's force scale. In the effort to recapture our innocence, one set of data—made aboard ***S.M.S. Gazelle***—played a prominent role. Dr. Simpson says: "By far the most important series of observations used by the Seewarte was that made on the ***Gazelle***. The ***Gazelle*** was a large sailing ship of the type specified by Beaufort. In the years 1874 to 1876 she made a cruise for scientific purposes which took her into all oceans. An anemometer was carried, and regular Beaufort estimates and simultaneous measurements of the velocity were made. As the ship was of the type specified by Beaufort, the estimates were of particular value, for the conditions described by Beaufort could be controlled by the ship itself. In the reduction of the observations, only those estimates were used which were made when the ship was sailing as described by Beaufort in his specification."

Simpson's heart is in the right place and his yarn is a good one but, unfortunately, not entirely true. One may suspect that between 1805 and 1874 ships changed a bit. In a picture of ***Gazelle*** and her sister ship ***Vinetta***, in the Straits of Magellan, nobody knows which is which and you can't see the critical underwater hull form. Neither ship crosses royals but they may have had them. Ships rounding the Horn customarily sent down their top–hamper.

To see how much hull forms could change in 50 years, compare ***Cutty Sark*** with ***Woolwich***. Admittedly, the comparison is not entirely fair, since a man–of–war carried the greatest weight in her guns above the waterline of necessity. A commercial carrier could get much more of her weight below the waterline, improving her stability and sail carrying capacity. I think it likely that ***Gazelle*** was intermediate between ***Woolwich*** and ***Cutty Sark***. Her function matches the former, her time of building, the latter.

There is an even more striking difference between ***Woolwich*** and ***Gazelle***. ***Gazelle*** was an auxiliary with 1,300 horsepower in her engines which could drive her at nine to ten knots. Under sail alone, in spite of dragging a two–blade screw, she could make 13.3 knots running free at Beaufort 7 to 8, and she could work to within 5 to 5½ points for the wind. ***Gazelle***



was clearly not a ship "of the type specified by Beaufort."

On close inspection the anemometer turns out to be a little, doubtful too. The Forschungsreise (official report of the *Gazelle* expedition) says: "Anemometer measurements aboard S.M. Corvette *Gazelle* were made with considerable care using a Kraft's handheld anemometer. At the time of sailing as well as upon the return of the ship there was no means of calibrating the anemometer available in Germany. Thus, for the present, the formulae given in the ship's log must be used to reduce the data. Since the instrument is no longer available and its constant is uncalibrated, nothing remains but to assume that the values recorded here are correct."

10.
Seldom experienced inland. Trees uprooted, considerable structural damage occurs.
11.
Very rarely experienced. Accompanied by widespread damage.

The thought of trying to find a free exposure for a hand–held anemometer in the tangle of lines aboard a square–rigger can make strong men blanch.

The line through *Gazelle* connecting the abstract Beaufort scale of 1926 with *H.M.S. Woolwich* in 1805 is a bit tenuous. The ship aboard which the data were taken was not the equivalent of Beaufort's man–of–war. She may have been sailing close–hauled, but she was most certainly not *in chase.* The anemometer used for the wind speeds was uncalibrated when *Gazelle* set out. It was uncalibrated when she returned. By the time there was anything to calibrate it with, the anemometer was long gone.

There is another point worth your notice. To take a dependable reading, you have to keep an anemometer well away from all obstructions. This is a ticklish problem even under the best conditions. The thought of trying to find a free exposure for a hand–held anemometer in the tangle of lines aboard a square–rigger can make strong men blanch.

In 1949 we got a whole new ball game. Following a resolution at the Directors Conference in 1947, wind velocities in knots replaced Beaufort numbers in coded reports. This change took anyone with an anemometer off the hook at once. But there were (and are) still the oceanic gaps in the weather net and eyeball estimates by seamen are still needed to plug them. Thus it became imperative to relate the seamen's guesses (logged in Beaufort numbers) to this wind speed in knots.
The meteorologist Verploegh set about establishing a relation by collecting 4,317 pairs of Beaufort estimates and anemometer measurements. A pair was made every three hours for a year from ***L.V. Terschellingerbank*** and from L.V. ***Texel.*** Verploegh's work is sophisticated and of a very high quality. His equivalents are in the modern Beaufort table, and they are the best there are.

With Verploegh's equivalents of 1956 I think we should lay the whole effort aside. The Beaufort force scale belongs to the seamen. It was derived by a sailor—for sailors— to meet an explicit situation. It did so handsomely. If Beaufort estimates continue to serve today's seamen in their day–to–day work, so much the better.

Scientists set in motion all the furor over finding a set of wind velocity equivalents for the Beaufort force numbers. That the Beaufort numbers were ever used as a telegraphic code for anemometer readings is one of those irrelevant accidents of history. If 100 years ago there had been a way to extend the weather net to the ocean, I suspect this whole Chinese fire drill would never have been laid on. The time has come to give Beaufort a decent burial— preferably at sea.

Solution to a Mystery

John Houghton and the rest of our friends at the British Meteorological Office have provided an update on Part 1 of this article: Mr. Frank Singleton indicates that they do hold the Beaufort log or logs, which contain his original enteries describing his newly created wind scale, at Bracknell. In his log of 1805, H.M.S. Woolwich, Beaufort wrote the original form of his wind scale and this is the one referred to in the Marine Observer article by Kinsman published in 1969, and which the Keeper of the Public Record Office could not locate. This log and the later one have been in the possession of the Meteorological Service for a long time.

Commander Beaufort, as he was then, transferred his wind scale table to the next Woolwich log, dated September 14, 1807, but ammended it to include his first reference describing the forces in terms of ship handling and sail setting; this is of course much earlier than the 1831 note from Beaufort to Fitzroy. Another point to bear in mind is that there probably existed two or three different logs on ships of that time: a Deck Log, a Captain's Log and the Master's Log, which was a private one which the Master would retain when transferred. It was no doubt Beaufort's practice to continue to complete his wind scale table on the fly leaf of each new log he opened, probably until he was appointed to a shore position, sometimes with further ammendments.

When it's done holding your ship's garbage, it could hold death for some marine animals.

This plastic trash bag may not look like a jellyfish to you. But to a hungry sea turtle, it might. And when the turtle swallows an empty bag, the mistake becomes fatal.

The problem is more than bags. Plastic six-pack holders sometimes become lodged around the necks and bills of pelicans and other seabirds, ultimately strangling or starving them. Other plastic refuse, either through ingestion or entanglement, causes the deaths of thousands of seals, whales, dolphins and other marine mammals every year.

Plastic debris also causes costly and potentially hazardous delays to shipping when it fouls propellers or clogs intake ports.

It's a critical issue, destined to attract public and government scrutiny if we fail to take action to solve it.

So please, stow your trash, and alert your shipping terminals that you will need proper disposal on land. A sea turtle may not know any better. But now, you do!

To learn more about how you can help, write: Center for Marine Conservation, 1725 De Sales Street, N.W., Suite 500, Washington, D.C. 20036.

A public service message from:
The Center for Marine Conservation
The National Oceanic and Atmospheric Administration
The Society of the Plastics Industry

View from Another Bridge

Ships in the fog–shrouded lower Mississippi and Gulf of Mexico make for a dangerous winter crossing to Mexico

Nigel Calder

Louisiana in the winter. For 6 weeks, in 1989, we had one cold front after another, each bringing with it two or three days of northerly winds. The last was a real rip–roaring, record–breaking storm: 45–knot winds pushed as far south as the Yucatan. Meanwhile, snow and sleet spread halfway across the Gulf of Mexico. Temperatures from Texas to Florida plummeted to an all–time low as orange growers throughout the south fretted over the loss of their crop. I crawled under our rented house to thaw out frozen pipes. And I spent plenty of time worrying about our friend Peter Hancock, headed for Isla Mujeres and somewhere out in the middle of the Gulf in his little 26–foot sailboat.

Nada, our 39–foot ketch, was almost ready for the same crossing, one which we had now made on three occasions. Since the Gulf of Mexico in the middle of winter is no place for small children, this time my wife Terrie and the children–Pippin (age four) and Paul (two and a half)– were going to fly to Cancun and then catch a ferry to meet me in Isla Mujeres. I had a friend, Jim Gorman, coming along with me on ***Nada*** as crew. For years he had dreamed of leading a voyaging life like ours, and now he was going to get his first taste of offshore sailing.

This article first appeared in ***Ocean Navigator***— November/December 1990 issue, No. 36. They are located at P.O Box 569, Portland, Maine 04112–9947. Nigel Calder is on their staff as a contributing editor and his most recent book is *Boatowner's Mechanical and Electrical Manual*, published by International Marine Publishing.

The photograph at right was taken by Nigel Calder as the Nada approached the anchored freighter **Ratna Deep** *in the foggy Mississippi.*

A Decision to make

At last we were all set and buoyed by a call from Peter announcing his safe arrival in Isla Mujeres. What we needed was a moderate cold front to drive us south, but now there was no sign of one; the last seemed to have temporarily spent all the reserves of energy from the Arctic. The National Weather Service office in Slidell, LA, forecast a period of southerly winds, putting us on a dead beat to windward– a miserable prospect which it seemed impossible to avoid since Terrie already had her tickets and we needed to get going. However, I started casting around for alternatives.

South of our home port of Mandeville, across Lake Pontchartrain, lies New Orleans and the Mississippi river. The river and its delta thrust out into the Gulf of Mexico a tantalizing 100 miles to windward. I had been warned by several people to stay clear of the river's lower reaches in a small boat, but nevertheless calculated that with an average river speed of four knots or better, if we entered the river at New Orleans near daybreak we could be safely out the South Pass before dark. Rather than run the river at night, if necessary we could always pull off to one side and anchor on a sand bank. It seemed like a perfectly sound plan to me and so the die was cast.

Soon after dark on December 28th we passed through the Industrial Locks onto the Mississippi, locking through with a large tug pushing an enormous barge train. This was our first sobering experience as I fought to keep Nada from being driven up against the steel lock gates by the tug's propeller wash. We let the tug get well clear, motored slowly out, and hooked around the back of the pilings at the lock entrance. I had previously reconnoitered this spot and determined that we could safely anchor here overnight, clear of all traffic, putting us in position to mover on down the river at first light.

We grounded! The previous week's record–breaking cold spell had virtually frozen the Mississippi above St. Louis, causing its level to drop dramatically. Gone was our safe haven for the night. We were forced, without radar, out onto the river in the dark: precisely the situation my plans had been designed to avoid.

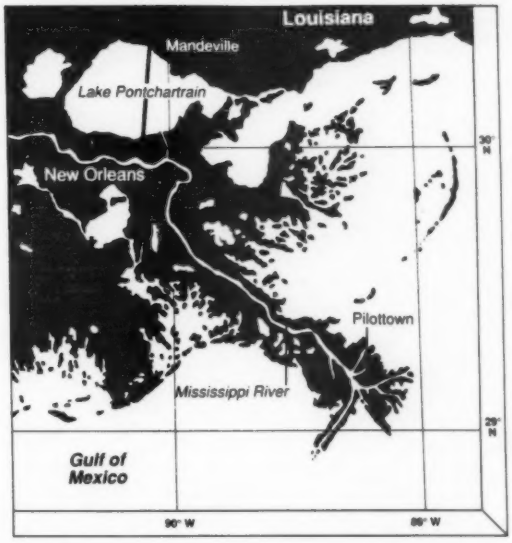
Nowhere to tie up

There were lights in all directions: City lights; flood lights on quaysides; and lights on a string of ships anchored in mid–channel. Against this backdrop we found it hard to make out the navigational lights on crew boats and barge traffic moving up and down the river. We crept down the west bank looking for a safe spot to tie up, eventually coming upon a crew–boat dock that seemed just about suited to our scale. Unfortunately, as we came alongside the docks an errant piece of steel grating, unseen in the dark, scarred Nada's brand new topsides paint job.

Here we had to contend with the constant wake of passing ships. And then, after half an hour of fiddling with fore and aft lines, spring lines, and all the fenders on the boat, we were just beginning to feel comfortable when the crew boat showed up and we were moved on. However, the captain kindly radioed his home base and fixed us up with a reasonably comfortable berth alongside a barge up the Chalmette Canal on the other side of the river.

Nigel Calder

To avoid headwinds the author used the Mississippi (right), gaining 100 miles to windward. Lacking radar, though, he was slowed by fog and spent 4 days on the river. Nada (below, left) tied up to a towboat and barge in the early morning fog on the lower Mississippi River. This is an industrial waterway with few berthing places for yachts.



Mississippi fog

Dawn came and with it a dense fog. A check with our thermometer showed that the water temperature was only 39°F. Warm air moving in with the south winds from the Gulf of Mexico was condensing over the cold river. Jim and I paced the deck looking for a sign of a clearing as our hopes of exiting the river in daylight faded. At 0830 the foreman of a work crew up on the quayside called down to let us know that they were about to start loading the barge with maize. We fired up the diesel, cast off and nosed out into the Mississippi.

The fog closed in eerily around us, cutting off visibility completely. Now we were vulnerable to any passing traffic and dependent on the vigilance of others to spot one tiny blip on a radar screen filled with clutter and larger blips. We eased back to the bank looking for a safer mooring but could find nothing. We discovered that there are almost no sandbanks on the lower reaches of the Mississippi and no places for a small boat to anchor: the rock–reinforced levees drop precipitously into 80 feet of water.

We were forced to move downstream about two boat lengths off the levee. This is not as easy as it sounds. Below New Orleans there are few traditional quaysides on the river. The loading docks consist of a series of massive pilings against which ships tie up and which are built well out into the river. As often as not, when one of these pilings first materialized in ghostly fashion out of the fog, we found ourselves between it and the bank and had to swing out into the river to come around it. As we passed the last piling on a dock we moved into a void, losing sight of both pilings and river bank. We had to feel our way back to the levee, fearful of colliding with a ship moving on or off the dock. An anxious river pilot called us on the VHF and told us to keep within 70 feet of the bank. Believe me, we were trying! We just had to get out of the shipping lanes.

We almost ran into a string of stationary oil barges and gratefully moored up alongside one of them. And then an hour later, quite suddenly, the fog lifted. Our spirits rose as we cast off and opened the throttle wide: the river is an entirely different place when you can see what's going on. Just as suddenly, 45 minutes later we were socked in as badly as before. We had to creep along the levee as we searched for another mooring. And so it went. For 3 long days we made our way down the river during breaks in the fog, frequently getting caught out and anxiously feeling our way to another uncertain spot clear of the river traffic.

Refuge with the pilots

We spent our last night on the Mississippi in Pilottown, almost at the mouth of the delta. Here the bar pilots, who bring the ships in and out of the Southwest Pass, and the river pilots, who take them up to New Orleans and back, have a small community built on pilings in the marsh. The pilots were hospitality itself, glad to have us where they could see us. They told us of another sailboat that had attempted to follow a tug boat out of the pass in a fog. After awhile the two became separated and an oil field crew boat, running at full speed under radar ran down and sank the sailboat. The point was sharply reinforced the following morning when a distress call came over the radio. An 18–foot fiberglass boat had run down and sunk a flatboat and was now on the rocks with a cracked hull. The Coast Guard launched a rescue— all the while repeatedly trying to locate another missing boat.

Finally a change in the weather. We had been delayed long enough to allow a fresh cold front to push down to Louisiana. The wind began to veer into the west and then the northwest. At 1500 hours on our fourth afternoon out of Mandeville, the fog began to thin. We cast off our nine mooring and snubbing lines, uncertain protection against the wake of passing big ships, and hurried out onto the river. As we headed for South Pass the last of the fog blew away to reveal a line of ships anchored up

Nigel Calder

the river as far as the eye could see, also awaiting clear weather to leave. We hoped these would be the last ships we would see at close quarters, at least on this trip.

We rounded the South Pass sea buoy as the light faded from the western sky, scudding south at 6 to 7 knots under a single poled–out jib in a 20–knot following wind. The motion was uncomfortable as *Nada* rolled first one gunwale into the seas and then the other, but who cared? We were dead on track and finally moving well. I settled back in the cockpit while Jim went below to catch up on some sleep after three disturbed and restless nights.

A near–deadly encounter

The hours rolled by. By midnight we were 50 miles out and now I picked up the lights of a ship off our starboard quarter. I watched intently for some minutes and realized that our relative bearings were not changing: We were on a collision course. I made a 30° course change to pass to the ship's stern. A little later its lights started to come around and we were back on a collision course.

I was rattled. I came around another 30° and watched in horror a moment later as it did, too. I was now staring at a red port light, a green starboard light, and right in the middle, a white bow light. The lights were alarmingly close.

"Jim," I yelled. "You'd better get out here fast!"

He sprang out of his berth.

"I believe this bastard's trying to run us down. Crank the motor!"

The ignition key and engine panel are inside the cabin to keep them well away from salt spray. Jim jumped to the navigation station, found the key and mercifully the motor fired immediately. I threw *Nada* in forward, opened the throttle wide and kept on coming around. The ship was almost upon us now, its lights high above us. Jim was on the VHF on channel 16. "Ship bearing down on us, don't run us down. Don't run us down!"

I found myself thinking quite calmly: "I believe the bugger's going to get us. This is really it." I have a fatalistic streak and was almost not surprised. We all have to go sometime and at this moment I felt sure it was our time.

We were still turning out of the ship's path. By now I had absolutely no sense of direction: my attention was focused solely on that massive steel bow and in squeezing out of its way. And we did, by a few yards— watching as the bluff steel side rushed by us. We sat in the cockpit trembling. "Are you alright, Jim?" I asked my shipmate.

And then a strongly accented voice came over the radio. "Ha, ha, ha, Happy New Year, Happy New Year." That was it. We were both too shaken to respond, but Jim glanced at his watch. It was the New Year.

There is still no doubt in my mind that the skipper of that ship quite deliberately tried to run us down. Since the Americans had just invaded Panama, we speculated that it might have been an angry Central American venting his frustration on "Yankee Imperialism" by getting an American yacht. We will never know. The incident disturbed us for the rest of the crossing as we headed ever farther south in generally favorable conditions. We debated endlessly the proper strategy for dealing with such a situation and even considered taking down the radar reflector and turning off our navigation lights–better to be unseen than to be a target. However, we knew this was an irrational response to a once–in–a–lifetime occurrence.

And so we closed the coast of the Yucatan, heading up towards the 100–fathom line on the Campeche Bank, aiming for the same spot (24°N, 88°W) as our friend Peter Hancock had 10 days earlier. Here we hoped to get a boost from what, on the satellite–derived thermal charts of the Gulf of Mexico, looked like a back eddy in the Gulf Stream. The wind eased and steadily veered into the east. We set more sail and hauled in the

sheets to maintain our speed and course. Finally, I engaged the diesel and motor–sailed in order to keep our speed up to 6 knots. The days lost to the fog had put us on a tight schedule, since Terrie and the gang would be arriving in Cancun in 2 days. In late afternoon I was dozing below and Jim was on watch.

Another dangerous ship

"Nigel, we're overtaking a ship" Jim announced to me.

In 20 years of sailing I have never overtaken a ship on the high seas— something was wrong, I shot out of the bunk, still shaken by our earlier New Year's Eve encounter. But sure enough, there it lay almost dead ahead in the water. We were overtaking a ship! The light was failing as we slowly closed. Its steaming lights came on and then it slowly turned towards us.
"What the hell's he doing?" asked Jim.

"Calm down. He's probably just curious. It's a little unnerving, but this happens from time to time."

Jim tried, without success, to raise the ship on channel 16.

"This is the sailboat *Nada* calling the ship off our port bow. Please come in."

The ship continued to move slowly in our direction, but it was still well off. Nevertheless, I came around 30° to the west. After a few minutes it came around. Another sharp course change. We were now headed due west, the sheets slacked, *Nada* gathering speed. The ship continued to come around and bear down on us, though still at a safe distance. I felt like I was being herded back out into the Gulf of Mexico. We had the flare gun out, ready to put a shot across its bows and Jim was back on the radio.

"This is the sailboat *Nada*. Would the ship coming up astern please come in."

Then a voice in good English. No identification, just a question: "How long is your boat?"

"Thirty–nine feet."

"How fast will it go?"

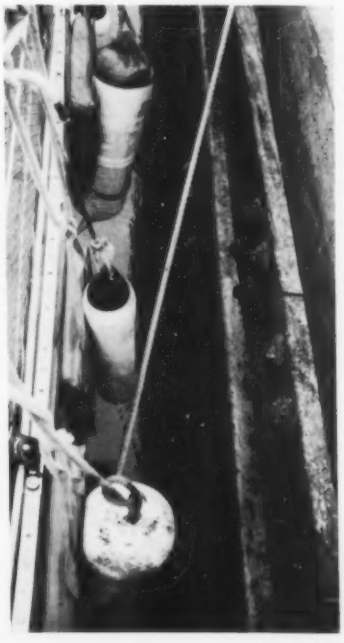
We didn't like the tone of the conversation. Jim lied. "Five and a half knots. Please identify yourself."

"What kind of navigation equipment do you have?"

"A satellite receiver, but it's broken," Jim lied again.

"Where are you going?" I tried to hiss "Rio Lagartos" at Jim, but I was too late. He answered: "Isla Mujeres."

By now it was dark and since the ship appeared to be drawing no closer I came back onto our original heading. The ship came around in a broad arc behind us. There was no further talk. At about this time we hit the hoped for eddy in the Gulf Stream and our speed over the bottom accelerated to more than 8 knots. Nevertheless, it was almost 3 hours before we finally lost the ship's lights and breathed a little easier.



Nigel Calder

With the lack of yacht facilities, on the river, the Nada crew is forced to tie up alongside a loading dock (left). Tying up in Pilottown (right) required heavy–duty fenders since the docks were built for commercial vessels.

Still jumpy

What is a ship doing just hanging around like that? In our unsettled state of state of mind we wondered if it was perhaps awaiting a rendezvous with drug runners and whether we might have problems with it. (Years ago we met a trawler yacht in Isla Mujeres with numerous bullet holes in its superstructure from a brief encounter with drug smugglers.) Since the ship knew where we were going, would we be intercepted along the coast the following night? Were we just being paranoid? Probably so, but this is an area of the world in which legitimate doubt is justified.

The next night we were both tense as we worked our way around the tip of the Yucatan, hard on the wind in uncomfortable seas. The sky was black and squally; the cloud cover heavy. At one point the moon broke through and momentarily shone into the cockpit like a spotlight, giving me a fright that kept me awake for hours.

At dawn we were off Contoy light and into the home stretch. Before noon we were safely anchored alongside Peter on his boat *Kylie* and slowly starting to unwind. The following day our families caught up with us and then a week later Jim and his family returned to the States. He gave up his plans to go voyaging! Terrie, the children and I continued on to a leisurely voyage in the Yucatan, Belize, Guatemala and Honduras in company with Peter on *Kylie*. We hardly saw a single large ship the whole trip and that was fine with me.

Sandy Hook Lighthouse

Elinor DeWire

New Jersey's northernmost exposed beach is a 5–mile strip of natural sand that points like a guiding finger toward bustling New York City. In Colonial days this slender spit, called Sandy Hook, was likened to an extended arm holding a lamp that beckoned newcomers to the land of promise. Perhaps the strand's first owner, English Quaker Richard Hartshorn, kept a fire beacon blazing here in the mid–1600s to warn ships away, but there are no official records to confirm this. Later residents of the area probably showed pole lanterns or built bonfires on the beach. These beacons were truly a welcome sight from sea, but also a dreaded one. Sandy Hook was, and still is, one of the most notorious ship graveyards on the Eastern Seaboard.

Old sailing ships headed into New York harbor had to navigate past this piece of shifty real estate via a channel that was narrow and shallow in spots. Many a vessel met its demise here, with the glow of Old New York City looming on the horizon. Historians estimate that if all the skeletons of shipwrecks along Sandy Hook were laid end to end, they would stretch to Barnegat (some 43 miles away)!

For this reason, two important missions went to work on Sandy Hook. The U.S. Lifesaving Service, and its intrepid surfmen, began pounding the beach at Spermacetti Cove in the mid–1800s and launched their lifeboats whenever a foundering ship was sighted. Aiding them were the beacons of the U.S. Lighthouse Service on duty at Navesink highlands, the northern tip of Sandy Hook, and on two offshore lightships. Most notable of these was the Sandy Hook Lighthouse— the third sentinel built in the colonies, and the only pre–Revolutionary beacon still operating in near–original condition.

Sandy Hook Light is the oldest operating light tower in the nation. Lighthouses were built at Boston, Nantucket, Beavertail in Rhode Island, and at Long Island Sound's New London Har-

Elinor DeWire

The U.S. Lifesaving station was located at Spermacetti Cove. The U.S. Life–Saving Service originated from volunteer groups in the days of sail. In 1848, the U.S. government established stations along the Long Island and New Jersey coasts.

U.S. Coast Guard

As described in 1764: "This house is of an Octagon figure, having eight equal sides; the Diameter of the Base 29 feet; and at the Top of the Wall 15 feet. The Lanthorn is 7 feet high ; the Circumference 15 feet. The whole construction of the Lanthorn is Iron; the top covered with Copper. There are 48 Oil Blazes. The building from the surface is nine stories; the whole from bottom to top 103 feet."

bor prior to the establishment of Sandy Hook Light in 1764, but these earlier towers deteriorated and newer ones replaced them. Only Sandy Hook retains its original tower, a stone bastion held secure by mortar as stubborn and indefatigable as the spirit of American independence.

Though Sandy Hook Lighthouse was completed in less than 2 years, plans for it had been made as early as the 1670s. East Jersey's governor at that time was advised to purchase land from Richard Hartshorn and build a "seamark for shipping." A suitable location and specifications for the lighthouse were given to the governor. But for reasons unknown—some say he allied himself with mooncussers in the area—he did not act upon the suggestion. A century passed before the idea was revived.

New Jersey's inertia angered colonists in New York, who depended heavily on ship traffic sailing past Sandy Hook. In 1761, New Yorkers took matters into their own hands with a lottery that raised enough money to purchase 4 acres of land at the northern tip of Sandy Hook. Two years later another New York lottery yielded sufficient funds to begin building the lighthouse, a rubblestone tower of octagonal shape with a black iron lantern. Forty-eight oil lamps made its beam visible 15 miles at sea.

Built by architect Isaac Conro and called New York Lighthouse, it stood 103 feet tall and was whitewashed to serve as a daymark against the beige sands and cedar scrub. It was officially placed in service on June 11, 1764, and though it stood on New Jersey soil, it belonged to New York. Years later, the two factions would argue over ownership of the historic tower, while the new Federal government, anxious to mollify each, would assume control of the sentry and change its name to Sandy

Hook Lighthouse.

Prior to the Revolution, the lighthouse was maintained through collection of a tonnage tax on passing ships. The tax proved quite successful, amply providing for supplies and a keeper's salary, plus a handsome profit for the port of New York.

Excess funds were not used to make the keeper's life more bearable however. The first keeper was permitted to have two cows and a garden, but the beasts had little appetite for beach grass and stumbled about the dunes bawling from the bite of constant sand–spray. The garden wasn't much of a success either, as few vegetables would grow in such a sandy, wind–scoured patch overlooking the sea.

During the Revolution, the Provincial Congress of New York felt it prudent to "render the lighthouse entirely useless" before the arrival of the British Fleet. This was accomplished by the removal of the tower's illuminating apparatus. Later, British forces tried to destroy the tower with cannon fire but found its walls impenetrable. Impressed by its strength, the British decided to use the tower as a base for raids on the Americans, and it remained under their control until the closing days of the war.

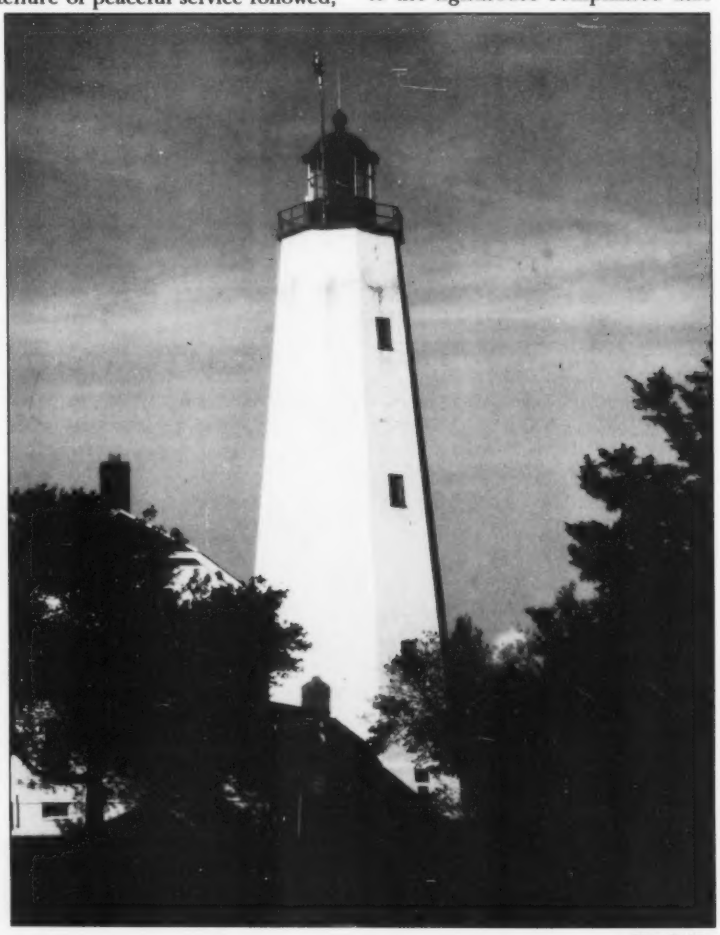
Interestingly, during this time the peninsula of Sandy Hook was cut off from the mainland by a narrow inlet. General Howe, retreating from the Battle of Monmouth in 1778, had to build a bridge to reach what he called Sandy Hook Island. By 1800 the inlet had become choked with sand and closed, but in 1810 and again in 1830 Sandy Hook was shown on maps as an island.

The strand has also altered its shape over the centuries—sometimes quite narrow in spots; sometimes acquiring peculiar bulges. A strong long–shoring effect, coupled with vulnerability to storm winds and waves, makes Sandy Hook a fickle strip of sand.

When the lighthouse was built in 1764, it stood 500 feet from the northern tip of the peninsula. Today it sits more than a mile and a half from the tip.

Following the Revolution, Sandy Hook Lighthouse was re–lighted and placed in the care of the newly formed Federal government, along with 11 other Colonial lighthouses. A long tenure of peaceful service followed, punctuated by occasional curious events and visitors. Among the unusual guests were a continuous stream of treasure seekers lured to Sandy Hook by rumors that Captain Kidd had buried booty there. The area around old Horseshoe Cove was ardently combed, since near it stood a huge pine called "Captain Kidd's Tree." Supposedly, Kidd buried his treasure under or in the vicinity of the tree, but none has ever been found.

About 1850 a new keeper to the lighthouse complained that



Elinor DeWire

The light is a 60,000–candlepower, third order electric light, fixed white, in a white stone tower, 85 feet above ground and 88 feet above water, visible for 15 miles.

there was no entry to the cellar in the keeper's house. No one seemed to know why the cellar had been closed off, but permission was granted to construct a door and stairway to the basement. When the keeper removed some floorboards and climbed down into the dark cellar with a lantern, he was greeted by an eerie scene.

Seated at a table was a skeleton, and ashes lay in a makeshift fireplace along one wall. Some 80 years later the graves of four men and one woman were found just outside the lighthouse. Neither the skeleton nor the bodies was ever identified.

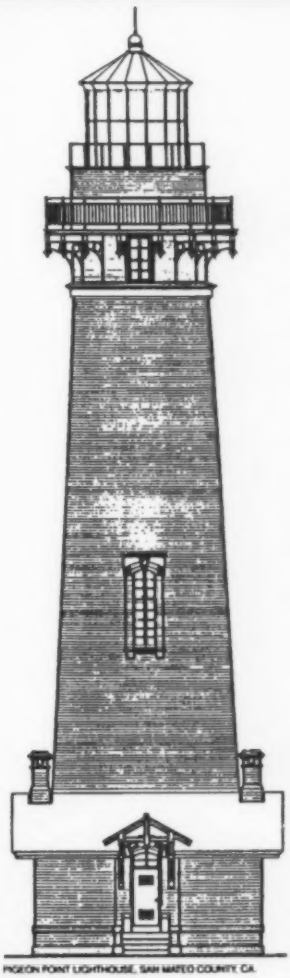
Also in the 1850s, the Lighthouse Board conducted an inspection of the old tower and found it quite sound. In fact, it was ranked third in the nation in efficiency and fitness. Eighteen Argand lamps and reflectors illuminated the lantern at that time. The Board suggested these be replaced by a Fresnel lens of the third order. This was done in 1857, and a few years later the inside of the tower was lined with bricks for added stability and a new iron staircase was installed. The only other significant changes made to the tower were the replacement of the iron lantern cap in 1880 and electrification in the 1920s. Otherwise, Sandy Hook Light remains much the same as it was on the night it first shone a warning beam.

In 1962 the lighthouse was automated to cut operating costs. Like many of its sisters, it became vulnerable to the elements and vandalism, despite being surrounded by Fort Hancock, which had been built in the 1850s. Two years later, on the anniversary of its 200th year of service, it was declared a National Historic Landmark. Both the Coast Guard and the National Park Service vowed to help preserve this living relic.

The lighthouse was further honored in 1989–'90 during the bicentennial celebrations of the Lighthouse Service and the U.S. Coast Guard. Since it is the oldest continuously operating lighthouse in the United States and served under both the Colonial and the Federal governments, it was featured on the U.S. Postal Service's 1990 commemorative series of five stamps honoring the 200th birthday of the U.S. Coast Guard.

Sandy Hook Light will celebrate its 227th birthday this June—an old soldier still on duty, with no plans to retire from its watch. Without a doubt, it's the patriarch of American lighthouses. Sandy Hook Lighthouse has a retinue of loyal friends to defend it, should any enemies threaten, even the sea. As the showpiece of Gateway National Recreational Area, it receives thousands of visitors each year, while still beckoning to ships headed toward the land of promise.

SANDY HOOK, NEW JERSEY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Seven Seas or Seventy Seven?

Earl R. Hinz

*Mr Earl Hinz, with whom we have corresponded in the past, was kind enough to send an article which recently ran in the publication— **Waterfront Log**. Earl is Editor Emeritus of the magazine, which is put out by the Hawaii Maritime Center, Pier Seven, Honolulu Harbor, Honolulu, HI 96813. In his letter he mentions that they have a list of 77 seas compared to the total of 54 we mentioned in this column in the last issue. Our information was taken from the International Hydrographic Bureau publication— Limits of Oceans and Seas, Special Publication No. 23, 3rd Edition 1953. This is the official international body for such names. However, they are not charged with determining just how many seas there are. In fact, in this book they do not, for example, include the Antarctic. Possibly there may also be, as Mr. Hinz suggests, some differences on how small a body of water can be termed a sea. The real problem lies with each country's interpretation of a sea. Nevertheless, his article is excellent and evidently much effort went into determining an accurate count. I thought it would be most appropriate for this column.*

Ed.

Sailing The Seven Seas

Earl R. Hinz

One sure way to get an argument started among seagoing people is to ask the question: "Which are the Seven Seas?" You can get as many answers as you have people. Unfortunately, there is no authority to whom we can turn with confidence. Encyclopedias simply list the seven oceans of the world— North and South Atlantic, North and South Pacific, Indian, Arctic and Antarctic Oceans. That is truly begging the question. First, they are not seas, but oceans. Second, the Atlantic and Pacific Oceans are each single bodies of water stretching from the Arctic to the Antarctic and to divide each of them in two simply to get seven bodies of water instead of just five is a sham.

But what is the mystical attraction of the number seven in the first place? It was born on superstition and old time sailors were among the most superstitious persons in the world. Seven has been a magic number for people in all recorded history. The biblical *seven times seven*; the seven ages of man; the seven wonders of the ancient world; the seven wandering planets of early astronomers; the seven deadly sins; and the seventh son of the seventh son. Someone has even pointed out that we have seven holes in our heads. More recently, a 14-man panel (7 x 2) composed of marine scientists, conservationists and explorers concocted the *seven underwater wonders of the world.* Superstition may be on the wane, but the number seven plays an important role in our life, far out of proportion to its humble position in Arabic numeration.

As for seas, there are more like 77 of them. (There go those sevens again.) Technically, a sea is a smaller body of salt water connected with an ocean, but having substantial land areas separating the two. By common usage it is also applied to salty bodies of inland waters such as the Salton Sea, the Caspian Sea or the Dead Sea. Not only is the boundary of a sea hard to define, but the definition, itself, is blurred. If we choose to forego strict adherence to academic principles and, instead, let a little historic romance creep into our lives, we can then locate seven seas.

In the early days of Phoenician commerce, the seven seas would have been defined as the Mediterranean and its adjacent smaller seas, the Cretan, Aegean, Ionian, Adriatic, Tyrrhenian and Ligurian Seas. Those were the

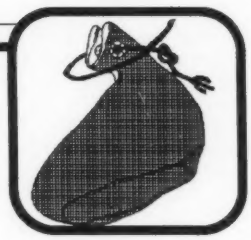
known boundaries of the ancient world and the seas upon which their commerce flowed.

While Phoenician merchants may have been content with their seven seas of commerce, explorers continued to expand the known world. We soon had another seven: the (entire) Mediterranean, the Red Sea, the Persian Gulf, the East African Sea, the West African Sea, the Indian Ocean and the China Sea.

The term *seven seas* first entered the written English language in the period 1870-75, but it took Rudyard Kipling to make it famous in his collection of poems *The Seven Seas* in 1896. Kipling did not, however, identify his seven seas. We can only deduce which ones he had in mind by noting that his travels to that time were made on British East Indiamen.

Although the British East India Company was founded on the opium trade between India and China, that later changed to the tea trade and still later to spices. The spices were found not in India or China, but in a part of the East Indies. The islands which grew the pungent vegetable seeds, 'more valuable than the tea and silks of China', were a part of what we now call Indonesia. Then they were called the Spice Islands. One should note, however, that these islands were not the private domain of the British, who in actuality were late–comers. The Spice Islands were earlier exploited by the Portuguese and the Dutch.

It is within the Spice Islands that we find a most plausible answer to our question. We note that the islands of Indonesia are separated by, you guessed it, seven seas— South China Sea, Celebes Sea, Molucca Sea, Banda Sea, Flores Sea, Bali Sea, and the Java Sea. Any sailor worth his salt (or in this case pepper) in Kipling's time would have sailed those seas aboard an East Indiaman, hence, the term *sailing the seven seas.*



A Rough February

Captain Afzal Shaikh

On the 2d of February 1990, I celebrated my 1-month anniversary in command of the motor vessel ***Darien***, a 15,097-ton (deadweight) freedom vessel at the port of Chimbote, Peru.

That afternoon we were setting sail, bound for Rostock via the Panama Canal, loaded with a cargo of fishmeal. On the 6th, we arrived in Panama. Just before transit, there was a crew change and we sailed early morning of the 8th for the ship's final destination.

"February is a very bad month for the North Atlantic," I told the chief officer, who was standing on the bridge. I was afraid, so I told the chief officer to be ready for such weather. The next day my fears started coming true in the Caribbean, when the wind freshened from the northeast soon attaining Force 7 gale with a head swell. The vessel was pounding, pitching heavily at times, shipping seas and spray on hatches and deck. At one time I had to alter course to send the crew forward to check cargo gear lashings.

Rough weather continued nearly to the Mona Passage. There was a small lull and after a day's passage, again the vessel faced strong wind, from the north, up to Force 7 or 8. Shipping seas and spray, heavy rolling and pitching continued from the 12th through the 17th, when the wind finally diminished to a force 3 or 4 as we approached the Azores.

At midnight on the 17th, it appeared that the vessel crossed a cold front, when the wind backed and shifted to the west. In the late afternoon the wind backed further, and then veered a little before settling down from the west. Beaufort force kept on increasing gradually up to an 8, until the afternoon of the 21st when it attained severe gale 9.

This is an excerpt from a report by Captain Afzal Shaikh, Master of the M/V Darien, which appeared in the Amver Bulletin No. 2/90. We thank AMVER and Captain Shaikh.

The radio forecast had storm force 10 for the area my vessel was passing through (north of the Azores). Winds were then mainly from the south southwest, and the atmosphere was filled with spray and salt. I had the ship steering a course of 42° true, while white seas and heavy deep swell from the stern and quarter, made her pitch and pound heavily like a toy, with jerks creating heavy vibrations all over. Though the direction was not from the beam, at times heavy swells broke frighteningly on deck and hatches. I was afraid of water ingress in the hatches. A small consolation was that the seas were following, pushing the vessel out of the area quickly. Heavy pitching confirmed the height of the swell as 9 meters (28 feet)when she was in a trough.

Channel 16 gave a call from a 100-meter long ship that was close by, to any vessel in the vicinity. Our contact was not clear, but I believe we received her call sign as DCKF, asking for a weather report by radio. She was hove to, being bound for the U.S. from Europe and had no radio officer on board, but was fitted with facsimile and Navtex. Still, the master preferred a report through radio by a radio officer. I passed him the relevant information.

We received two S.O.S.'s during this time, but far to the north of us. We were in the middle of the ocean where shore assistance was not possible. It is here that I realized the importance of AMVER, who can help find merchant assistance for any scene.

As our vessel entered the English Channel, weather again deteriorated due to a storm in the

In the Marine Weather Review for February (Summer 1990 issue) we described February 1990 as a month that most likely stood alone as far as storm activity goes. The greatest storm activity took place between Iceland and Ireland as indicated by the negative 36–millibar departures from normal for that month. However the storms were not confined to that region as Captain Shaikh can attest; he also has visual proof (right).

vicinity. A westerly gale of force 8 was observed. We passed the position near Casquet TSS, where a Pakistani freighter, the M/V ***Murree,*** sank during gales gusting up to force 10 and 11 on October 28, 1989. She was marked by four cardinal marks. As we passed, the wind force increased to severe gale 9, again from the west.

Another storm warning was received while we were in the Dover Strait and heading toward the North Sea (Skaw to Rostock). A storm rated to be a 10 on the scale, and gusts of Hurricane force 11, were observed as well. We had only a little diesel fuel at this point, just enough to reach our next port, as the shaft generator was off load and nearly continuous diesel consumption had exhausted our reserve. As there was no shelter or anchorage in the North Sea during this season, I was forced to continue through this terror.

Early on the morning of the 26th we met actual force 11 from the west, while steering a course of 021° true. Everything on board was a mess, with the ship rolling 50° and more, much beyond the limit of our inclinometer. There were times when I could see the crest of big, heavy waves at an angle of elevation from the bridge, and we were forced to think that she would not come back. Those heavy waves and swells broke on top of the vessel and reflected from the main deck right up to the wheelhouse windows. Pressure fell to 973 millibars. Several urgent calls were received in the vicinity. On approaching Skaw, weather improved and our vessel arrived safely in Rostock after receiving bunkers at anchor in Danish waters.

Several things impressed me about this excellent account. First of all it certainly verifies the ferocity of last February in the North Atlantic. It is easy to look at climatic charts, weather maps, satellite photographs and even ship reports and become rather blasé about extratropical storms. After all they don't photograph particularly well and there are so many of them. It's when you read a first–hand account that can relate the danger and the fear that these storms generate, that makes you remember that there are people living and working out there in that hostile environment, whose very lives depend upon accurate weather forecasts and even current reports of weather conditions. Critical decisions have to be made in a very short period of time and conditions can change from one minute to the next. I came across a saying that is appropriate to these situations: Education is what you get from reading the fine print, while experience is what you get when you don't. Ship reports can give us the fine print needed to pin down these storms and when you talk to marine forecasters you realize just how important they consider your report.

The other thing that struck me is the use and referral to Beaufort force. There seems to be no getting away from the scale entirely. It is how many mariners think, it is their background and they are comfortable with it. It is up to the scientist to adapt his ways to these of the mariner instead of dictating the way the mariner should think. Also not lost, is the mention of the radio officer and the faith placed in him.

This is certainly enough of a sermon for one issue, but we do want to encourage these types of reports. They not only make good reading but they do help educate people to the dangers that mariners face in their daily lives.

Ed.

Parramore Beach Coast Guard

In November, Ray Brown, Norfolk PMO and I visited one of the U.S. Coast Guard's most interesting locations— Parramore Beach, which is located offshore from Wachapreague, VA along the Eastern Shore. This is an important weather observing station as well as a Coast Guard location. It is one of the few left that can only be reached by boat. We were hosted by BMC Richard Taylor, Officer in Charge and BM1 Brian Hatfield. Ray visits Parramore twice a year as part of his PMO duties.

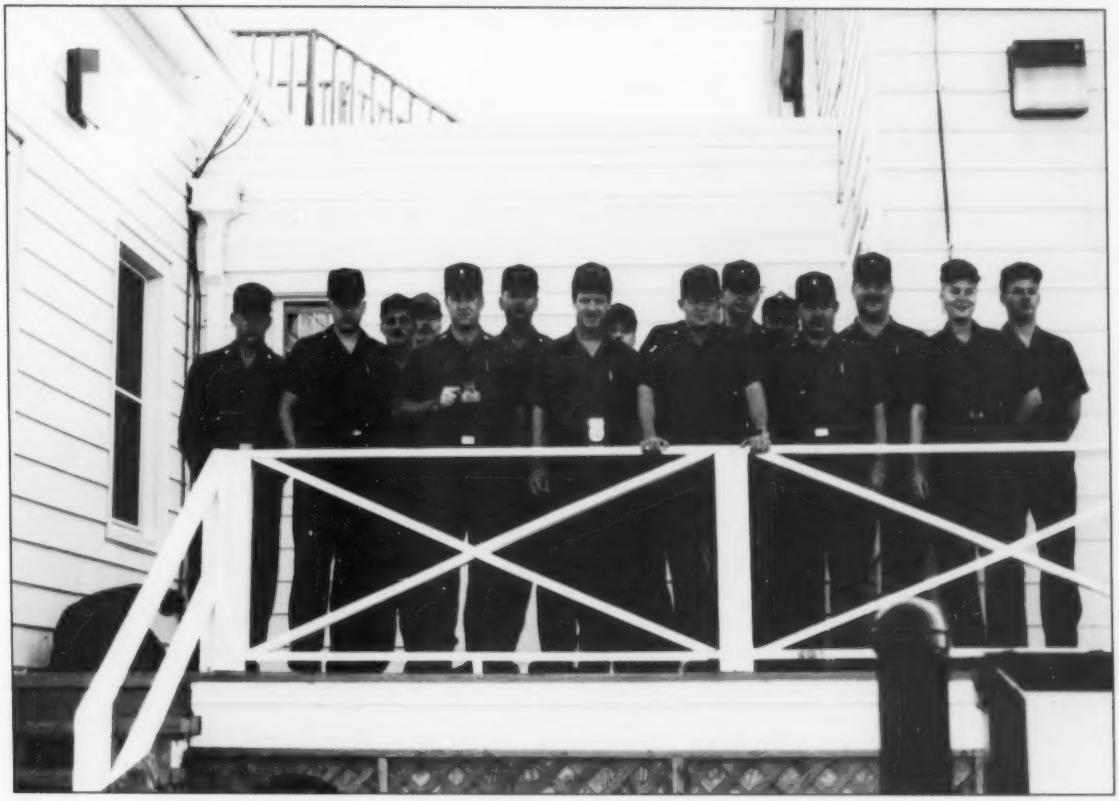
The station was established in 1882 on the seaward side of the island. However, damage to the beach caused by the August hurricane of 1933 led to a new station being built on the west side of the north end of Parramore Is. in 1936. The station is powered by its own generator and has water storage tanks.

In 1985 the station received a Meritorious Unit Commendation. On the 16th of July 1985, lightning struck a tree and started a fire on Parramore Island. Within 2 hours crew members and volunteers from the town of Wachapreague were on the fire line with the fire burning just 800 yards from the station. Using hand tools to fight the fire in the marsh grass, they were able to contain it. On the 19th fire broke out again, this time more fiercely, and winds were blowing it in the direction of the station. With volunteers from other Group units, they fought to save the station. That same day the fire reached within 50 yards of the station as volunteers continued to work for long hours. They were finally able to contain the blaze, and, although the fire burned for 8 more days it did not threaten the Coast Guard location again.

Because of their coastal locations Coast Guard stations play a vital role in the weather observing network of NOAA and their efforts are greatly appreciated.

Officer in Charge, BMC Richard L. Taylor (above) keeps things running smoothly. He is used to the island life, being a native Chincoteaguer.

Richard Taylor took this photograph of the old Coast Guard Station, which had survived numerous storms over the years but fell to a fire just a few years ago.



U.S. Coast Guard Station, Parramore Beach Virginia

Severe Storm at Sea Award

The Maritime Association of the Port of New York/New Jersey recently presented the Severe Storm at Sea Award to the United States Air Force's 21st and 67th Special Operations Squadrons for their outstanding rescue of the M/S ***Yarrawonga***. The ceremony, sponsored by the Chemikalien See Transport, Sea–Land Service, Inc. and Transport Mutual Services took place on Liberty Island.

On January 13, 1989, the cargo vessel ***Yarrawonga***, bound from Norway to the St. Lawrence Seaway suffered two large gashes in her hull due to hurricane–force winds and 30–foot seas. Stranded 530 miles off the west coast of Ireland, the vessel was taking on water through a 200 square meter hole in her starboard side and began to list badly. The engine failed and the crew sent out a radio message for assistance.

There were no other vessels in the vicinity and neither the British military nor civilian rescue services had helicopters that could reach the stricken vessel and return, or re–fuel in flight. However, the MH–53 helicopters of the U.S. Air Force's 21st special Operations Squadron at Royal Air Force Base in Eastern England did have in–flight fueling abilities. The HC–130 tankers of the U.S. Air Force's 67th Special Operations Squadron were also available to provide the re–fueling.

Because of the severity of the storm, the U.S. Air Force was assisted by British Air Force Nimrod Aircraft. Upon reaching the ***Yarrawonga***, the helicopter pilots determined that the ship's condition and weather would make it impossible to land on the vessel. Thus, a pararescue specialist was lowered to the ship to assist the crew. One helicopter was able to hoist 17 people aboard, while the second saved the remaining 15 crewmembers. The operation took a little more than 1 hour.

Global Ocean Observing System

National and international attention is now being focused on energy policies. The effect of these policies on the global environment can be measured only with a great deal more information than we have now. Recognizing this, world leaders will soon consider endorsing a global climate monitoring system, which has an ocean monitoring system as a substantial component. The ocean plays a key role in determining the earth's climate. Any possibility of predicting climate beyond a few weeks demands that ocean behavior be taken into account. The effect of the ocean on the atmosphere could be either to moderate or intensify changes in climate.

The Intergovernmental Oceanographic Commission, in cooperation with the World Meteorological Organization, is preparing plans for a comprehensive Global Ocean Observing System. At the Second World Climate Conference held in Geneva in November 1990 a great deal of interest was expressed in climate monitoring. Dr. Federico Mayor, the Director–General of UNESCO, said, "Scientific assessments strongly point to the urgent need for a global ocean observing system providing adequate data, which can be assimilated and fed into climate prediction models. We know this is needed, and the longer we delay action the further we fall behind in our ability to make reliable climate change predictions." This system will also contribute to monitoring needs for pollution, weather forecasting, coastal zone management, and fisheries.

Initial emphasis will be placed on strengthening national contributions to existing systems such as the Voluntary Observing Ship Program. The Global Ocean Observing System will include satellite measurements as well as conventional observations from ships, buoys, tide gauges, and autonomous vehicles. Emerging technological developments will help enormously.

The 30–year old World Weather Watch is frequently used as an example on which to build a long–term ocean monitoring system. The world Weather Watch is an example of successful international cooperation in collecting, transmitting and exchanging data globally. It is the only international operational program to gather and distribute environmental data on a global scale. The network of 7,000 Voluntary Observing Ships operated by 49 countries is a part of the World Weather Watch.

American Merchant Marine Seamanship Trophy

The captain of a fishing boat, which rescued survivors of a capsized vessel in a stormy Gulf of Mexico, has been selected as the 1990 recipient of the American Merchant Marine Seamanship trophy.

Early on July 31, 1989, Captain Auld was taking the ***Spur Royal*** through the Gulf of Mexico to seek shelter from approaching Hurricane Chantal. At about 5 a.m., he heard a faint distress call on the radio and noted that the lights of a far–off vessel, which he had been observing suddenly disappeared.

Despite 50–knot winds, 9–foot seas and worsening weather conditions, Captain Auld steered a for the last known location of the troubled vessel, while alerting his three–member crew to stand by for possible rescue operations.

Arriving on the scene, Captain Auld found that the ***Arco V***, a liftboat used for maintenance operations in the offshore mineral and oil industry, had capsized on its port side. Using his ship's spotlight, Auld located one mariner grasping a life float whom they pulled to safety. Two others were found clinging to a single life preserver. After some 20 minutes of gingerly maneuvering his ship in the severe weather to achieve a safe rescue position, Captain Auld and his crew were able to bring both seamen aboard.

A fourth crew member was found holding onto the capsized hull. Captain Auld determined that it was too risky an attempt for the ***Spur Royal***, but stood by until a Coast Guard helicopter arrived and, pulled the survivor aboard. Then Captain Auld set out to search for other survivors. None were found. In all, 10 crewmen of the ***Arco V*** perished in the stormy Gulf waters.

The nomination of Captain Auld by the U.S. Coast Guard Station, Houston, TX, for the trophy, said: "The actions of Captain Auld and his crew were exemplary, totally selfless and representative of the highest standards of maritime professionalism and good seamanship."

Captain Auld is the twenty–first winner of the Seamanship Trophy since it was established in 1962 to recognize feats of exceptional seamanship under adverse conditions. Recipients are chosen by a Select Committee chaired by the U.S. Maritime Administrator and comprised of representatives of maritime labor and management. Administration of the selection process is the responsibility of the U.S. Merchant Marine Academy in Kings Point, NY.

Christopher Columbus Celebration

CHRISTOPHER COLUMBUS 500 QUINCENTENARY JUBILEE COMMISSION

In 1992 we will celebrate the 500th anniversary of Columbus' voyage to the *New World.* A number of activities are already being planned. In the United States, the Christopher Columbus Quincentenary Jubilee Commission is promoting this occasion. Its Maritime Committee plans coordinates, encourages and conducts programs in commemoration of the seafaring legacy of Columbus. Their objectives are to increase the number of visits of both replicas of Columbus' ships and the tall ships of the world, and to increase the educational and cultural impact of these visits to American port cities. They also encourage maritime projects that meet the Commission's criteria for the endorsement of Official Quincentenary Projects. Any maritime project that meets these criteria is eligible for this national recognition. Essentially, a sea–related project must be shown to increase public awareness of the seafaring legacy of Columbus, and it must be self–funding. The Commission reviews proposals for this endorsement. Their address is:

Christopher Columbus
Quincentenary Jubilee
Commission
1801 F St., NW
Washington, DC 20006

On March 19,1990, President Bush wrote to the Commission Chairman, John N. Goudie, asking that the tall ships of all nations be invited to participate in the Quincentenary. The Maritime Committee is establishing ongoing communication with these ships to facilitate their visits to the United States.

On August 3, 1990, 498 years after Columbus' voyage, the Spanish Navy launched replicas of the ***Nina***, ***Pinta***, and the ***Santa Maria*** at the port of Palos de la Frontera in Spain. In order for Americans to share in this exploration, the U.S. Commission has joined with the government of Spain to create the Caravels Tour. In November 1991, the three replicas, called Caravels when taken together, will sail from the Canary Islands to San Salvador, the Bahamas and then continue, in the following years, to Florida, the Gulf of Mexico, the East Coast, the West Coast and the Great Lakes. The tour is scheduled to end in October 1993. More details on schedules of the Caravels and the tall ships will be carried in future issues as well as an article about the weather encountered by Christopher Columbus.

Vinland Revisited

Not to be outdone by the Italians and the Spanish, in the Fall of 1991, the Norsemen will again visit North America to celebrate the millennial anniversary of their ancestors' Viking visit in the year 1000 AD. *Vinland Revisited* will re–enact the historic crossing of the Atlantic by Leif "the Lucky" Ericsson that took him in bad weather past Greenland's southern tip to land in Labrador, reputedly the first European landfall in North America. He dubbed it Vinland and quickly dashed back to Greenland to report its discovery. In the 1960s archeologists gave credence to this report when they discovered evidence of Norse settlements in Newfoundland. (A fact my wife won't let me forget, she being of Norwegian descent and the best part of my heritage being Italian.)

Project manager Harald C. Bjerke of Norway told the Newport Daily News in Newport, RI that three Viking replica vessels will stop there on September 20,1991. Other stops include Halifax in late August, Boston on September 11 and finally Washington on October 9 to attend the celebration of Leif Ericsson Day. Two vessels will be shipped to Halifax, but the ***Gokstad***, a replica of an 80–foot Norse vessel of the same period, will trace the original route of 1000 AD.

Long Island Iceberg

Scientists have precisely tracked the 3–year journey of an iceberg almost the size of Long Island, New York, as it lumbered 1,250 miles through a remote Antarctic sea— borne by currents whose behavior was newly discovered by charting the iceberg's progress.

Using satellite images accurate to within 0.2 mile, cryologists from Columbia University and other institutions have mapped the great iceberg since it broke from the Ross Ice Shelf, slowly drifted northward, turned and crashed back against the coast, rotated, moved rapidly northwestward, and finally broke into three pieces.

A report on the iceberg's odyssey and the information it provided about currents in the Ross Sea appears in the fall issue of the journal *Antarctic Science.* The authors are Harry Keys of the Science and Research Division of New Zealand's Department of Conservation, Stan Jacobs, an oceanographer at Columbia University's Lamont–Doherty Geological Observatory, and Don Barnett of the Navy/NOAA Joint Ice Center in Washington, DC.

Battling North Atlantic Icebergs

Icebergs, mainly from the glaciers of west Greenland, are carried southward to the waters off the Grand Banks by the cold Labrador Current. The Labrador Current converges with the significantly warmer waters of the Gulf Stream, and sea water temperature differences of up to 20°C can exist. The formation of dense fog occurs up to 40 to 50 percent of the time. This combined threat of fog, icebergs, and severe North Atlantic storms, plus the concentration of trans-Atlantic shipping, fishing vessels, and oil platforms, makes the Grand Banks one of the most dangerous areas in the world for marine transportation.

Information concerning ice conditions is collected primarily from patrol surveillance flights, other aircraft, and ships operating in or passing through the waters of the Grand Banks. All shipping may assist in the operation of International Ice Patrol by reporting all sightings of ice at once to:
COMINTICEPAT GROTON, CT.

To report ice sightings send them through the U.S. Coast Guard Communication Stations. If unable to work these stations use the Canadian Coast Guard Station, St. John's/VON or any other Canadian Coast Guard Station.

When reporting ice, please include the following information:

SHIP NAME AND CALL SIGN
POSITION (OF VESSEL OR ICE - SPECIFY)
TIME OF SIGHTING
SIGHTING METHOD (VISUAL OR RADAR)
SIZE AND SHAPE OF ICEBERG
CONCENTRATION OF ICE (FOR SEA ICE, IN TENTHS)
THICKNESS OF ICE (FOR SEA ICE, IN FEET OR METERS)

The following table can be used to help describe the icebergs:

Size				Type		
Descriptive Name		Height (ft)	Length (ft)	Shape		Description
Growler	(G)	<17	<50	Non–Tabular	(N)	This category covers all icebergs that are not tabular–shaped as described below; includes bergs dome–shaped, sloping, blocky and pinnacle.
Small Berg	(S)	17–50	50–200			
Medium Berg	(M)	51–150	201–400			
Large Berg	(L)	151–240	401–670	Tabular	(T)	Flat topped icebergs with length–height ratio >(greater than) 5:1.
Very Large Berg	(V)	>240	>670			

Sources of International Ice Patrol Iceberg Sightings By Size— 1990

Sighting Source	Growler	Small	Medium	Large	Radar	Total	Percent of Total
Coast Guard (IIP)	107	255	353	115	65	895	33.0
Commercial Ship	79	242	582	171	54	1128	41.7
Other Air Recon	64	204	91	30	0	389	14.3
DOD Sources	4	56	86	23	1	170	6.2
Canadian AES	13	56	17	7	21	114	4.2
BAPS	0	1	0	0	0	1	.1
Lighthouse/Shore	1	0	5	0	0	6	.4
Other	0	0	0	1	0	1	.1
Total	268	814	1134	347	141	2704	100.0

INTERNATIONAL ICE PATROL BROADCASTS

BROADCAST STATION	TIME OF BROADCAST	FREQUENCIES (kHz)
NAVTEX Ice Broadcast C.G. Comm. Stn Boston/*NIK*	0445, 1045 1645, 2245	518
NBDP (FEC) Ice Broadcast C.G. Comm. Stn. Boston/*NIK*	0018 1218	5320, 8502, 12750, 85502, 12750
CW Broadcasts C.G. Comm. Stn. Boston/*NIK* (follows NBDP Broadcast)	0050 1250	5320, 8502, 12750 8502, 12750
Canadian CG Radio Stn. St. John's/*VON*	0000 1330	478
Canadian Forces METOC Centre Halifax/*CFH*	0015, 1101 1301, 1401 2201, 2301	122.5 (off air 1200-1600 2nd Thurs. each month) 4271 2200–1000, 6330 Cont. 10536 Cont.,13510 1000-2200 UTC
LCMP Broadcast Norfolk, VA *NMN/NAM/NAR/NRK/AOK/ GXH/NGR*	0800-0900, 1500-1600 1600-1700, 2100-2200	8090 Cont., 12135 Cont. 16180 Cont., 20225 (1200-2359)
Thurso, Scotland/*GXH*	Same Times	7504.5 Cont., 12691 (0800-1900) 4001 (1900-0800)
Keflavik, Iceland/*NRK*	Same Times	5167 (1900-0800)
Key West, Florida/*NAR*	Same Times	5870 Cont., 2675 (1200-2359)
Rota, Spain/*AOK*	Same Times	5917.5 Cont., 7705 Cont.
Nea Makri, Greece/*NGR*	Same Times	4623 Cont., 13372.5 (0800-1900)
Radiofacsimile Broadcasts C.G. Comm. Stn. Boston/*NIK*	1600	8502, 12750(+/- 400 Hz)
Can. Forces METOC Cen. Halifax/*CFH* (Primarily sea ice in Gulf of St. Lawrence and north. Iceberg limits sometimes given)	0015, 1101 1301, 1401 2201, 2301	122.5 Cont., (off air 1200-1600 2nd Thur. each month) 4271 2200–1000 6330 Cont., 10536 Cont., 13510 1000–2200
Radio Stn. Bracknell, U.K./*GFE* (Eastern N. Atlc Sea Ice Obs.)	1413	2618.5 (1800-0600, Oct. 1-Mar 31: 1900-0500, Apr 1-Sep 30) 4782 Cont., 6330 Cont., 10536 Cont., 13510 100–2200
Special Broadcasts Can C.G. Radio Stn. St. John's/*VON*	As requred when icebergs sighted outside ice limits between sched. broadcasts.	2598 Radiotelephone preceeded by Int. Safety Signal (SECURITE) on 2182 kHz. 478(CW)-preceeded by Int. Safety Signal (TTT) on 500 kHz.
C.G. Comm. Stn. Boston/*NIK*	As requred when icebergs sighted outside ice limits between sched. broadcasts. NAVTEX upon receipt of first available window. NBDP (FEC) next sched. broadcast.	2670 Radiotelephone preceded by Int.Safety Signal (SECURITE) on 2182 kHz. 472 (CW) preceded by Int. Safety Signal (TTT) on 500 kHz.
Internatioanl Ice Patrol Vessel *NIDK* (when assigned)	When in the vicinity of ice in periods of darkness or fog.	2670 preceeded by Int. Safety Signal (SECURITE) on 2182 kHz.

A New Columnist—

Michael Halminski

Michael Halminski is a professional photographer, who lives and works on the Outer Banks of North Carolina. He has done so for the past 17 years. Nearly all of his work relates to the marine environment, in particular the Outer Banks. He does all his own printing and has a gallery in Waves, NC, which is located on the northern part of Hatteras Island. His gallery is of post and beam construction and is very well suited to the rugged environment of the Banks.

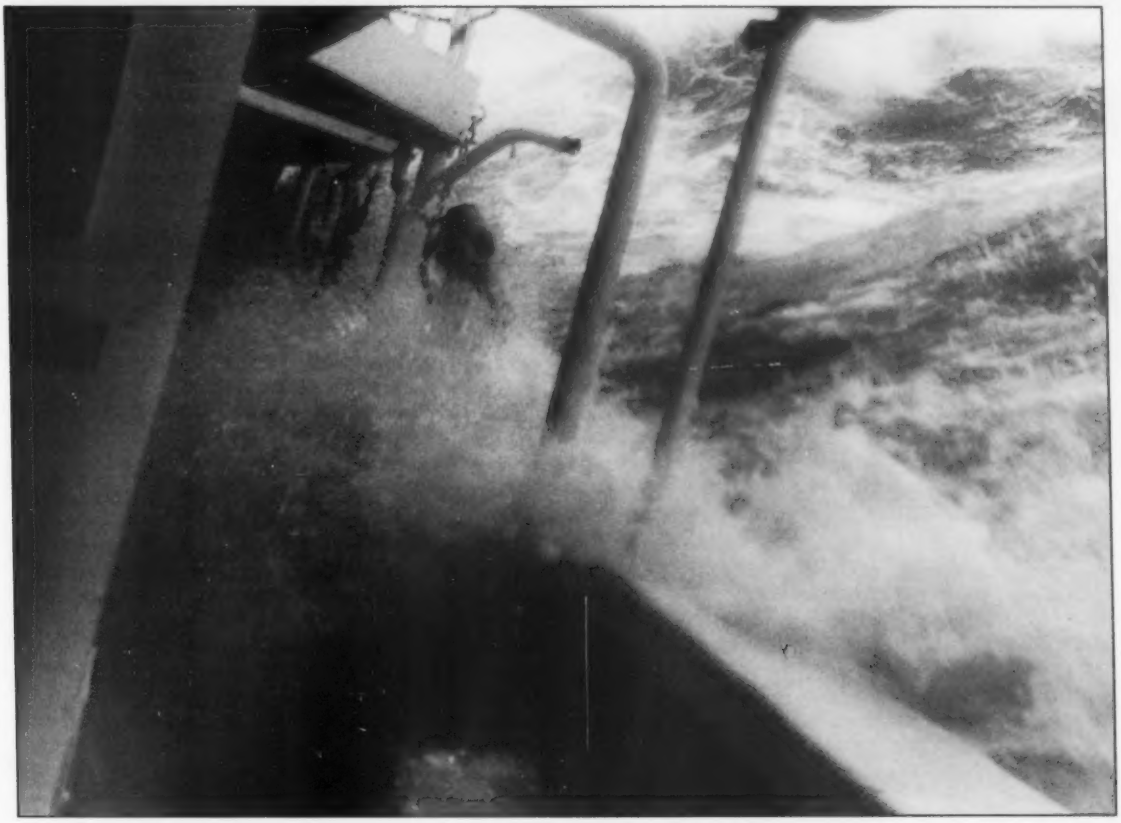
In addition to his gallery exhibit, Michael is working closely with the North Carolina Aquarium to coordinate a permanent exhibit of his works. He also freelances for such publications as Newsweek, the Washington Post, Philadelphia Enquirer and North Carolina Wildlife. He has spent considerable time photographing the sailing Skipjacks of Chesapeake Bay and the rain forests of Costa Rica, in addition to his North Carolina work. He also has done photographic work on sailing trips, including a stint from Panama to Los Angeles. Last summer he began conducting photo seminars on the Outer Banks. Michael has agreed to share some of his knowledge with us in this column.

In addition we will continue to run photographs from our readers and hopefully his advice will encourage you to take more marine phtographs.

Michael Halminski
photographer
Gallery & Darkroom - Fine Prints Since 1973

Michael Halminski

This photograph by Michael Halminski was taken in October of 1990. This is the Herbert Bonner Bridge over Oregon Inlet, which links Hatteras Island to the Nags Head area. During a storm, the 200–foot dredge, Northerly Island broke its moorings and took out a 370–foot section of the bridge, stranding hundreds of tourists and leaving Hatteras Island without power and telephone service. There will be a special article and more photographs in the next issue of the Mariners Weather Log.



Rough Seas on *Bartlett*

Pete Connors, PMO Miami sent in a photograph that was taken aboard the Military Sealift Command ship, the ***USNS Bartlett***. The ***Bartlett*** spends almost 300 days per year at sea doing research. During their North Atlantic voyage, on November 19, 1990, they encountered 28–foot seas. The photo above was taken from the bow during this period. To the right is the crew of the vessel. From left to right: Captain S. Meyer, 2/M Wendy Vaught, c/m S. Cavallo and in the back row is C/Purser R. Lemon. We thank them for this shot.

If you have a good weather or oceanographic photograph, send it in, along with a brief description of the situation, to:

Mariners Weather Log
National Oceanographic Data Center, NOAA
Washington, DC 20235

Who Needs Ship's Weather Observations?

James Nelson
PMO, Houston

When I go aboard ship for a routine visit and ask the Captain if he would like to join the weather observing program, I often hear comments such as, "I don't have time because I'm shorthanded," "I don't have a radio operator," or "I go coastwise so you don't need any weather from me." But the best one of all is: "You don't need any observations, you have satellites."

Satellites show where the sky is clear and cloudy and provide a thermal profile, but only you know the weather at your position! Satellites can't look through cloud cover to tell us how hard the wind is blowing, what the pressure is, how high the seas are, or what type of precipitation is falling. Forecasters, worldwide look for the synoptic ship report, which might give them a clue as to whether a low is getting stronger or weaker. Whether you are on the high seas or going coastal, your reports are vital.

Observations are Important

Over land a great number of hourly observations are received at computer centers around the world and are exchanged with other countries by way of the Global Telecommunications System (GTS). These hourly observations are used extensively by civil aviation and meteorologists to keep up with ever–changing trends in weather. In addition, there are 6–hourly synoptic observations taken by thousands of land sites around the world for use in the surface analysis. The generated weather analysis maps are then broadcast over landline computer and/or facsimile circuits, and radio facsimile.

Over water areas we have a limited response. Even though water covers much of the earth's surface, we still have a problem convincing ship personnel that their weather reports are valuable. It is not unusual to have an analysis over the ocean based on 100 ship reports. While 100 may seem large, if you put that many dots on a large base map they get lost. Also more than half of those 100 observations are usually along a regular trade route, leaving a vast expanse of uncovered ocean.

Historical Significance

Prior to World War II, oceanic analysis was not done routinely, in real time, like it is done today. Even over land it took hours for the weather to be received and plotted by hand. The Japanese used bad weather to successfully cloak their movements prior to, and during, their approach to the Hawaiian Islands for their attack on Pearl Harbor on December 7, 1941. They received special broadcasts with synoptic data and vital ship reports from their task force, which enabled them to move undetected across the Pacific.

The Allies began to realize the importance of weather and many campaigns commenced on the basis of a weather forecast. The landings made on the beaches of Normandy on June 6, 1944, were successful, in part, because of a forecasted, brief lull in storm conditions. As Allies moved across the Pacific Ocean, a network of observation sites was established and maintained. Military and merchant marine vessels played a critical role in this overall scheme. Ships underway had to record weather observations for the deck log, but it was not until late in the war that most ships started transmitting weather. Compared to the sophisticated computer systems of today, this was somewhat crude, but served its purpose.

This system continued after the war. Beginning in the fifties

and sixties, computers started doing some of the data processing needed to build forecast models. It was soon realized that the lack of ship reports often hampered this effort. Through the seventies and eighties, merchant fleets shrank as ship size increased, so that the number of observations decreased. Even with this decrease, an adequate number is theoretically available if everyone cooperates. Many tramp ships do not use regular routes and their observations are especially vital.

Today's Program

Recruiting is the most important role of the Port Meteorologist. We talk to many ship's Captains who realize the value of taking and sending weather observations. Some believe that U.S. PMO's work strictly for their own program. In reality, all nations benefit when we enlist a ship in the Voluntary Observing Ship program, since this is actually a World Meteorological Organization program. All ship data are passed around the world via GTS, which is unique in that it has been in operation for many years. Within minutes of receipt, a weather observation is available for use at forecast centers worldwide.

Ship observations are not only used to make forecasts. They are used to verify forecasts and also in climatological studies. Researchers use observations for a particular area, or a particular storm to understand why a system behaved in a certain manner.

Tommorow's Program

While advances in observation techniques and practices have taken place over the past 50 years, the basic structure has remained the same. However, with increasing automation of shipboard operations, weather services are looking for better ways to receive observations in the future. One idea is the automatic transmission of weather data direct to satellite. The United States has a system called Shipboard Environmental Data Acquisition System (SEAS). Each SEAS ship has a time slot assigned for transmission of weather data directly to a satellite. Once the observer enters the weather data into the SEAS unit, it waits until the pre-programmed time for the transmission. Currently the U.S. has deployed 125 SEAS units for use in transmitting weather and oceanographic observations. Ships with these units have the capability of transmitting up to eight observations per day.

Your Friendly PMO

Remember, when you see a PMO from any country coming aboard for a visit, he's there to help you. He's not trying to get something for free. The things he wants you to do will pay you back by providing more accurate weather maps and forecasts. He will also provide a barometer check to help ensure a safe voyage. If you are in the Voluntary Observing Ship (VOS) program, the PMO will also make sure your supplies are up to operating levels. U.S. PMOs will also provide you with the latest Pilot Chart and Mariners Weather Log. Sometimes, you will receive literature that pertains to some aspect of the VOS program.

How can you go wrong? Not only are you provided with everything you need to do the job, but you get a more accurate end result. Even if you have a weather routing service, they too benefit from your observations. So if you don't belong please think about joining the next time a PMO comes aboard.

Nelson's Boat Show

In addition to his regular PMO duties, authoring articles and keeping up the weather radio frequency changes, PMO Jim Nelson can be seen by his fans at least once a year at the Houston International Boat, Sport & Travel Show. This year the show, sponsored by the Boating Trade Association of Metropolitan Houston was held at the Astrohall/ Astroarena/ Expo Center Complex from January 4 through the 13th. The National Ocean Service and National Weather Service shared the same booth and were there to stress public safety.

Does this guy look like a used car salesman or what? He is actually one of the nicest guys you would ever want to meet, and one reason the PMO program is so successful. Jim Nelson, author the the article above is seen here at the Houston International Boat, Sport & Travel Show. So who needs Elvis? The show had 20 acres of boats, campers, motorhomes, travel trailers, camping equipment, hunting and fishing gear and other outdoor goodies.

Getting to know your PMO

Bob Collins, PMO Chicago

Bob Collins is without a doubt one of the finest PMOs in the country. While Chicago is his base, he travels a good portion of the Great Lakes region to spread the word, not only about the VOS program but about the National Weather Service in general. In 1989 Bob received the Department of Commerce Bronze Medal for his improvements to marine weather services in the central Great Lakes area. Among other things, he was sighted for advancing 3–hourly reporting schedules on the Great Lakes and developing a nearshore reporting program on the south and west sides of Lake Michigan.

MWL: Bob, tell us a little bit about your Air Force background.

Bob: I enlisted in 1961, attended weather observer school at Chanute AFB, IL, and worked as an observer until 1968. I went back to Chanute for Forecaster school and have been to many exotic places like Korea, Thailand and Okinawa. I returned to Chanute in 1978 as an Instructor Supervisor in the Forecaster Branch. (He was Instructor of the Year in 1979). While teaching, I attended night school at Eastern Illinois University where I earned two Associates Degrees and a Bachelor of Arts degree. I was in graduate school when I decided to retire in 1983 as a Master Sergeant.

MWL: How did you begin in the NWS?

Bob: My first NWS job was as a Radar Specialist at Marseilles from 1983–86. I became the PMO here in 1986.

MWL: Is there interaction with your Canadian counterparts?

Bob: The Chicago area is frequently visited by Canadian vessels. They do an outstanding job and are a real pleasure to visit and work with. Both George Smith in Cleveland and I maintain close contact with our Canadian counterparts.

MWL: You do cover a lot of ground in this job, don't you?

Bob: There are seven main ports in the Chicago area and additional ports in Milwaukee and Kenosha, Wisconsin. The typical drive per day varies from 100 to 150 miles depending on the type of vessels. There are also visits to over 20 Coast Guard Stations on Lakes Michigan, Superior and Huron. My last swing around the lakes covered 1600 miles and I didn't get to Lake Huron.

MWL: What is the MAREP program?

Bob: The MAREP program here is to support the Near Shore Marine Forecast. We have thousands of boaters, power and sail,. that use the lake each recreational season and some 17 million swimmers and/or beach goers each summer. Many depend on the Near Shore Forecast to make plans. So, twice a day, from late May to early September, 14 beaches send reports 1 hour prior to the issuance of the Near Shore. Also available are commercial boaters whom we call from our office. Since 1987, we have increased the MAREP's from 11 to over 3,000 per season. Providers include the Chicago Park District, Calumet Marine Towing, Chicago Police Marine Unit, and Hanna Marine.

MWL: How important are Coast Guard observations on the Great Lakes?

Bob: Coast Guard reports are an important part of the data base used to support forecast products. We broadcast their observations on NOAA weather radio. The number of reports has fallen off due to manpower shortages, however.

MWL: We know you are a proud grandfather. Tell us about your family.

Bob: My wife, Sandy, is from Louisville, KY, and we were married in 1965. We just enthusiastically celebrated our 25th anniversary on the 16th of October. We have two sons, Rob 23, is a Sergeant in the Air Force,

currently serving in the Middle East. His wife, Crystal is an Airman First Class in the Air Force. They are stationed at Beale AFB, CA. We have one grandson, David who turned one on August 28th; the day of the Plainfield, IL tornado. Our youngest son Chris is 20 and has enlisted in the Army, so Sandy and I are a little tense at the moment.

MWL: Do you have any other outside interests?

Bob: One of my passions (other than Sandy) is presenting weather seminars to various groups such as clubs, schools and churches. Topics range from marine weather to tornado safety. I have conducted about 190 such seminars since 1983. My other interest is collecting sports cards, mainly baseball. I have about 75,000, with a few dating back to the late 1940's. It's relaxing and financially beneficial.

NOAA'S Hurricane Earle

This was the title of a great article on (Earle) Ray Brown, PMO Norfolk, in the most recent issue of the *Virginia Maritimer*, a publication of the Virginia Port Authority. The full title was *NOAA'S "Hurricane Earle" (...Ray Brown Jr.) Works Hampton Roads.* The author, accompanied Ray on a typical day at the office, which included visiting the ***Ming Ocean, Sea Merchant,*** and the ***Boston Trader*** among others. He was able to get a real flavor of just what the PMO job is all about and how important it is to the NWS. It was a good article and Ray gave him a few more good quotes than he gave the *Mariners Weather Log* when we interviewed him. For example, when the author noted that Ray's trunk was packed with handouts and supplies Ray quipped: "If I ever have a flat tire , I just might retire..." His front seat isn't always empty either (below). We shouldn't complain, however, as the article gave a nice plug to the Log. Congratulations to Ray on an interesting and well–deserved article.

Shenehon to Muskegon

The Great Lakes Environmental Research Laboratory (GLERL) of Ann Arbor, MI, has recently acquired the old U.S. Coast Guard Station in Muskegon, MI. This facility will be known as the Vessel Operations Facility and is now the home port of the NOAA research vessel ***Shenehon*** and the research launch ***Tones.*** The facility has three buildings totaling approximately 7,000 square feet and consists of a laboratory/office building, a workshop and a warehouse. The move from Grand Haven, MI to Muskegon was made during the middle of July and the official dedication of the facility was held on July 27, 1990. Many local, state and GLERL dignitaries attended the ceremony.

The facility will operate from the middle of February until near the end of December, and will make possible an expanded research program. GLERL conducts basic research on all of the Great Lakes and supplies technical assistance for the management of this natural resource. Below is a shot of the station along with the ***Shenehon.***

Rogues Gallery

Above, Ray Brown (left) presents Jack Mace, President of the Hampton Roads Maritime Association, a NOAA award for outstanding contributions to the Voluntary Observing Ship Program. The HMRA supplies Ray with vessel traffic information from the Virginia Pilot Association. Below, Tom Martin and Bland Creekmore (to the left of Ray), Vessel Operations Assistants, and Ernie Drum, Vessel Operations supervisor, accept the NOAA plaque of appreciation on behalf of Vessel Operations at Virginia International Terminals Inc. The award , usually presented to ship lines or individual vessels, is in appreciation for sharing up–to–date vessel schedules so that Ray can schedule his ship visits accordingly.

Above, George Smith, PMO Cleveland, presents an award for 1989 to the crew of the M/V **Paul A. Tregurtha** *(ex* **William J. Delancey***) one of our best Lake reporters. Shown with George (right) are Captain Ray Smith, with the plaque, and mate Eugene C. Christiansen. Also in the crew are mates Conrad Gilliam, Scott D. Parker, Michael E. LaCombe and Frederic J. Schmitt.*

Dave Van Brundt (below) is General Manager of Operations for the USS Great Lakes Fleet, Inc. Bob Collins presented this corporate award for the USS Fleet's outstanding participation in the VOS program.

This is Bob Webster's award page. Bob is the PMO for the Los Angeles/Long Beach area. Notice that Bob is only in one of these five shots. Jim Nelson, PMO Houston, would shake his head at the missed photo opportunities. The crew of the S/S **Maui** *(center) earned an award for outstanding observing during 1989. The crew was evidently a little camera shy. At the upper left, are 2d Mate Chris Curl and Captain Thomas Desjardins (holding award). They are*

from the R/V **Thomas Washington**. *At lower left, C/O John W. Madeley accepts the award on behalf of the M/V* **Polynesia**.

In the photograph at upper right Bob Webster (left) presents the outstanding award plaque to Captain Harold Coughlin of the M/T **Delaware Trader**. *At the lower right, Captain Ole Ueland and 2/O Joel Beltran accept the award for the M/V Ferncroft for their outstanding observation record in 1989.*

From Jacksonville, FL we have a couple of awards presented by PMO Larry Cain. One award for outstanding observations during 1989 went to the M/V **Sea Lion**. *In the upper left photograph, accepting the plaque on the bridge of the vessel are, from left to right, R/O Everett R. Pearson, Cadet Heather Dorricott and Captain Tony Hogg.*

At the lower left the crew of the M/V **Sea Wolf** *proudly display their plaque. From left to right are 3/M Derrick Shores, C/M Edward Ruth and Cadet Nick Lewis.*

Jack Warrelmann, PMO out of Newark had a few outstanding awards to present recently. At center is one of our favorite vessels around here, the **Oleander**. *Jack (right) presents the plaque to Captain Lijkele Kingma, while C/O Pietr Borst (far left) and 2/O Arent Van Draanen stand by. At upper right, the* **Fortaleza** *is represented by, from left to right, 2/M John Ambrose, Captain Morin and R/O Greg Farnum. Jack is at far left. At lower right is the presentation to the S.S.* **Humacao**. *Accepting the award from Jack are Captain Daniel J. Skwyra (center) and MREO Thomas P. Archontou (right).*

Points to Remember While Observing

Martin S. Baron
National Weather Service

When observing and recording meteorological conditions, it is of the utmost importance to proceed in a very careful and meticulous manner. An innacurate observation can mislead the forecaster and result in an incorrect forecast. On the other hand, a reliable observation can hold the key to an obscure or complex meteorological condition. Refer to National Weather Service Observing Handbook No. 1 for comprehensive definitions of the observed elements and coding instructions. Some hints to remember:

Observing Time And Order

Except for pressure, try to observe all the elements just before, or as close as possible to the reporting hour. Ideally, atmospheric pressure should be read exactly on the reporting hour, or a few moments before. Wave observations may require a little longer to complete, and should be started before the other elements. In darkness, instrumental observations requiring the use of a light should be made after non-instrumental ones, so as not to impair eye function.

Wind Direction And Speed

Visual estimates are based on the appearance of the sea surface, using the Beaufort scale. When there is an increasing or decreasing wind, there will be a lag period for the sea state to change. Heavy rain will cause a smoothing, or damping down, of the sea surface. When in shallow water or close inshore, Beaufort sea state criteria are less reliable because of the effects of land and tidal currents. When the surface of the sea is invisible on a dark night, estimate wind speed by noting wind effects on sound, smoke, and ship-board objects such as flags.

Cloud Amount, Type and Height

The most reliable observations of clouds are made by keeping as close and continuous a watch as possible on their development. There is a gradual transition between different cloud types. Avoid making only a brief examination of the sky at the observation hour.

Visibility

Because of the absence of suitable objects, it is generally not possible tomake visibility observations from ships as accurately as at land stations. Make use of targets on the radar screen. On long ships, when visibility is low, objects of known distances onboard should be used. In coastal areas, the appearance of landmarks can be used as a guide. In the absence of other objects, use the appearance of the horizon, or mentally sub-divide the known distance to the horizon. At night the appearance of navigation lights gives a useful indication of the visibility.

Ocean Waves, Period, Direction, And Height

The accepted standard is to use the average values of the better formed waves to compute wave period and height. Sea waves are characterized by a size irregularity, unlike the consistency and uniformity of swell waves. Avoid the temptation to split the smaller and larger waves of a given sea into different wave systems of sea and swell. The higher components of a sea can resemble swell by their longer crests and periods. Sea and swell do, however, occasionally come from the same direction. When this happens, the

period of the swell will be several seconds longer than that of the sea.

Ice Conditions

There are 3 forms of ice encountered by ships at sea: 1) sea ice, from the freezing of the sea surface; 2) river ice, in harbors and estuaries; and 3) land ice, or icebergs. The extent of sea ice can vary greatly from year to year and has a great meteorological influence on adjacent ocean areas and over large areas of the world. Icebergs and sea ice are dangerous to shipping, and impact navigation. Consequently, your ice reports are very important.

Atmospheric Pressure, Tendency Characteristic and Amount Of Change

The precision aneroid barometer and barograph are the standard pressure reading instruments for Voluntary Observing Ships (VOS). Barometers and barographs should be checked as frequently as possible, normally at least every 3 months, by a PMO with a standard pressure instrument. For ships in the U.S. VOS program, PMO's will adjust barometers to read sea-level pressure, since this is the pressure reported in the weather message. If the PMO is unable to adjust, he will post a "correction to sea level" which you must apply to each reading before coding. Vessels in the British VOS program and a few other countries have their barometers reading station pressure and adjust to sea-level before reporting. If this is the case onboard your vessel, please bring it to the attention of the PMO.

The barograph is used to record barometric tendencies and amount of change. It's a good idea to keep the barograph at Universal Time Coordinates throughout your voyage.

Temperature; Air (Dry Bulb), Dew Point (Wet Bulb), And Sea Surface

The sling psychrometer is the standard instrument used by National Weather Service VOS to measure air and dew point temperatures. If your vessel has an accurate fan ventilated psychrometer, this can also be used. To obtain accurate readings, psychrometers must be exposed in a stream of air, fresh from the sea, which has not been in contact with, or passed over the ship. The instrument must also be shielded from radiation, precipitation, and spray. The psychrometer thermometers should be read right after whirling or ventilation has stopped.

There are 2 widely used methods for measuring sea surface temperature: 1) using a bucket to take a sample of sea surface water, and measuring its temperature; and 2) reading the temperature of the condenser intake water, either with a fluid thermometer, or with an electrical remote indicating device. It is very important to use thermometers that are accurate and properly calibrated. Bucket thermometers are available for your use from National Weather Service PMO's.

Jim Downing (left), retired PMO for New Orleans is seen here presenting a VOS

New Orleans PMO Retires

Jim Downing, PMO in New Orleans, retired effective November 30, 1990, after having worked over 35 years for the National Weather Service (NWS). Before coming to the NWS in October, 1955, Jim spent two years in the Navy, at Miramar NAS, California. A new Orleans native, Jim also spent his entire NWS career in New Orleans. Before becoming PMO in October, 1984, he worked for the NWS as an observer and weather service specialist. Jim and Helen Downing have 4 children, and 7 grandchildren. As you might have guessed, they are planning to stay in New Orleans. The process of selecting the next PMO for New Orleans is now underway.

San Francisco PMO Takes Training Cruise

Robert Novak, PMO for the San Francisco Bay area, will be aboard the University Of California Maritime Academy's training ship Golden Bear/KIYG, on her annual winter cruise, during late January and February. This year's cruise, with 250 cadets, is to South America, around the horn. Bob will serve as the meteorology instructor, and will work with the cadets on their skills and knowledge about weather observing and the synoptic code.

New Recruits

PMO's recruited 59 vessels into the VOS program during October, November, and December, 1990. We sincerely thank these vessels for joining the Voluntary Observing Ship Program, and for agreeing to make and transmit weather observations.

NATIONAL WEATHER SERVICE VOLUNTARY OBSERVING SHIP PROGRAM
NEW RECRUITS FROM 01-OCT-90 TO 31-DEC-90

NAME OF SHIP	CALL	AGENT NAME	RECRUITING PMO
ALLIGATOR JOY	3EDD8	WILLIAMS DIMOND AND CO	SEATTLE, WA
ARCADE EAGLE	LAIB4	BARBER SHIP MANAGEMENT	JACKSONVILLE, FL
AUSTRAL LIGHTNING	WEZA	INTEROCEAN MANAGEMENT CO.	SAN FRANCISCO, CA
CAPE ANN	KCOJ	AMERICAN OVERSEAS MARINE CORP.	SAN FRANCISCO, CA
CAPE BLANCO	KNFN	AMERICAN PRRESIDENT LINES, LTD.	SEATTLE, WA
CAPE BOVER	WHTW	AMERICAN PRRESIDENT LINES, LTD.	SAN FRANCISCO, CA
CAPE CANSO	WLBO	MARINE CARRIERS (USA), INC.	JACKSONVILLE, FL
CAPE CARTHAGE	WJHN	AMERICAN OVERSEAS MARINE CORP.	SAN FRANCISCO, CA
CAPE CLEAR	KBNC	OMI CORP.	SAN FRANCISCO, CA
CAPE COD	KEAY	OMI CORP.	SAN FRANCISCO, CA
CAPE DECISION	WMGD	MARINE TRANSPORT LINES	NEWARK, NJ
CAPE DIAMOND	WMJH	MARINE TRANSPORT LINES	HOUSTON, TX
CAPE EDMONT	KGTE	INTEROCEAN MANAGEMENT CORP	SEATTLE, WA
CAPE FLATTERY	KIIA	INTERNATIONAL MARINE CARRIERS	SAN FRANCISCO, CA
CAPE GIBSON	KADB	AMERICAN PRESIDENT LINES	SAN FRANCISCO, CA
CAPE GIRARDEAU	KAAV	AMERICAN PRRESIDENT LINES	SAN FRANCISCO, CA
CAPE HENRY	KMJH	INTEROCEAN MANAGEMENT CORP.	HOUSTON, TX
CAPE ISABEL	KLHR	AMERICAN PRESIDENT LINES	SEATTLE, WA
CAPE JOHNSON	WJHA	AMERICAN FOREIGN SHIPPING CO.	SAN FRANCISCO, CA
CAPE JUBY	WEBW	AMERICAN FOREIGN SHIPPING CO.	NORFOLK, VA
CAPE LAMBERT	KJCJ	MARINE TRANSPORT LINES	JACKSONVILLE, FL
CAPE LOBOS	KEBA	MARINE TRANSPORT LINES	CLEVELAND, OH
CHI JIN	DZQE	NYK CAR CARRIERS	JACKSONVILLE, FL
COURIER	KAAG	MARINE CARRIERS (USA), INC.	NORFOLK, VA
D. L. BOWER	5LXC	CHEVRON SHIPPING CO	SAN FRANCISCO, CA
DEL MONTE	WNVW	LYKES BROS S/S CO.	HOUSTON, TX
GLOBAL FAME	3EJB7	TRANSMARINE NAVIGATION CORPORATION	SEATTLE, WA
GOPHER STATE	WCJV	INTEROCEAN MANAGEMENT CORP.	SAN FRANCISCO, CA
GREAT RIVER	DZDC	FRITZ MARITIME AGENCIES	LOS ANGELES, CA
GREEN HAWK	DUXF	RAINIER SHIPPING CO	SEATTLE, WA
GREEN SUMA	3EVE5	INTERNATIONAL SHIPPING CO INC	SEATTLE, WA
GULF TRADER	KRHI	ALL MARINE SERVICES LTD.	SAN FRANCISCO, CA
HANJIN TONGHAE	D7PT	HANJIN SHIPPING COMPANY	SEATTLE, WA
ITB BALTIMORE	WXKM	SHERIDAN TRANSPORTATION	NEWARK, NJ
ITB NEW YORK	WVDG	SHERIDAN TRANSPORTATION COMPANY INC	NEWARK, NJ
JO ROGN	LAFT2	JO MANAGEMENT	HOUSTON, TX
LNG LIBRA	WDZG	HORIZON AIR FREIGHT	NEW YORK CITY, NY
MAGLEBY MAERSK	OUSH2	MAERSK LINE	NEWARK, NJ
MAINE	KRLO	AMERICAN FOREIGN SHIPPING CO.	SAN FRANCISCO, CA
OCEAN MASTER	3EMD3	NYK LINE NORTH AMERICA, INC	SEATTLE, WA
OLEANDER	PJJU	BERMUDA AGENCIES LTD	NEWARK, NJ
ORIENTAL FERM	DZDB	CRIMSON LINE LTD	SEATTLE, WA
RAINBOW WARRIOR	PC8024	GREENPEACE	SAN FRANCISCO, CA
ROVER	KCBH	VULCAN CARRIERS LTD.	NEW YORK CITY, NY
SAMU	5LHX	UGLAND BROTHERS LTD	SEATTLE, WA
SANKO PIONEER	ELNA6	EASTERN SHIPPING CO, LTD	SEATTLE, WA
SAPAI	XYER	FRITZ MARITIME AGENCIES	HOUSTON, TX
SCHACKENBORG	OYUY4	WECO AGENCIES (TEXAS), INC.	HOUSTON, TX
SEABULK AMERICA	WWYY	HVIDE SHIPPING, INC	NEW YORK CITY, NY
SEALAND SPIRIT	WFLG	SEA-LAND SERVICE INC	SAN FRANCISCO, CA
SEAMAID	H2RS	THENAMARIS SHIPS MGMT, INC	JACKSONVILLE, FL
SKODSBORG	OYRJ4	WECO AGENCIES (TEXAS), INC.	HOUSTON, TX
STAR WILMINGTON	C6DJ	T.M.S.I.	HOUSTON, TX
STENA TRAILER	ZCAG2	SOUTHEAST MARITIME CO	JACKSONVILLE, FL
TAI CHUNG	BHFL	WORLD TRADEWAYS SHIPPING LTD	SEATTLE, WA
TAI SHING	BHFR	GENERAL STEAMSHIP CORP	SEATTLE, WA
USNA SIOUX	NJOV	USNS SIOUX T-ATF 171	SAN FRANCISCO, CA
USNS BELLATRIX	NHLL	USNS BELLATRIX (T-AKR 288)	HOUSTON, TX
USNS COMET	NJZP	AMERICAN PRESIDENT LINES	SEATTLE, WA
USNS NORTHERN LIGHT	NGYS	COMMANDING OFFICER	SAN FRANCISCO, CA
USNS TANNER	NTRN	COMMANDING OFFICER, USNS TANNER	JACKSONVILLE, FL
WASHINGTON	KXAW	AMERICAN FOREIGN SHIPPING CO.	HOUSTON, TX
WINDWARD	KERL	DONALD J. GAGNE	SAN FRANCISCO, CA
YOKOHAMA	ELID4	STRACHAN SHIPPING CO	JACKSONVILLE, FL

Everything You Always Wanted to Know About Hurricanes but Didn't Know Who to Ask?

I've heard these time and again. What was the biggest hurricane? What hurricane caused the most damage? Which was the deadliest hurricane? Andthese are just from around the office. I guess the National Hurricane Center hears them even more often. So they have done something about it. They have published a Technical Memorandum entitled: ***The Deadliest, Costliest, and Most Intense United States Hurricanes of this Century (And Other Frequently Requested Hurricane Facts)*** by resident experts Paul J. Hebert and Robert A. Case. This is actually an updated version (as of March 1990) of a previous publication issued in 1983.

If you are a statistics buff, a science writer, teacher, planner or just a hurricane nut, this pamphlet is for you. Its loaded with facts, which, of course, include Hurricane Hugo, the first category 4 or 5 hurricane to hit the U.S. since 1969. Three new tables have also been added since the last edition, and the publication is a gold mine of information.

Tables includelistings of deadliest and costliest hurricanes since 1900. There is also a summary of hurricanes that hit the U.S. and were Category 3, 4 or 5 on the Saffir/Simpson Scale. These lists are being published in hopes of presenting a single official source of such statistics. In some cases, data in the lists present revised estimates for individual hurricanes based on more complete information received after earlier published values, including some in the earlier edition.

Other informative tables include direct hurricane hits affecting the U.S. and individual states as well as the last occurrence of a direct hit or even an indirect hit by any hurricane and a major hurricane on the larger communities from Texas to Maine. For example, did you know that Miami's last direct hit by a major hurricane was Hurricane King back in 1950? That was when they were using the phonetic alphabet for names. St. Petersburg hasn't suffered a direct hit by a major hurricane since 1921. Do you know what was the largest number of hurricanes in existence in the Atlantic Ocean at one time? Well I am not going to tell, but it occurred in 1893. One hurricane remained at hurricane intensity for 20 days, while another formed as early as March. In one year we had 21 tropical cyclones in the North Atlantic and another year saw 12 hurricanes. If all this isn't enough, there are also plots showing where major hurricanes made landfall on the U.S. coasts by decade so you can study the latest trends. It is easy to see, for example, why the fifties was the decade of the East Coast storms. The trend for the last two decades is eye opening, but you will have to see it for yourself.

How can you get this fact–filled booklet? That is the easy part. It is available from:

National Technical Information Service
U.S. Dept of Commerce
5285 Port Royal Road
Springfield, VA 22151
U.S.A.

The cost is a mere $2.75 per copy Just ask for it by the title,March 1990 and NWS NHC 31.

Samoa Depression
Neville Koop

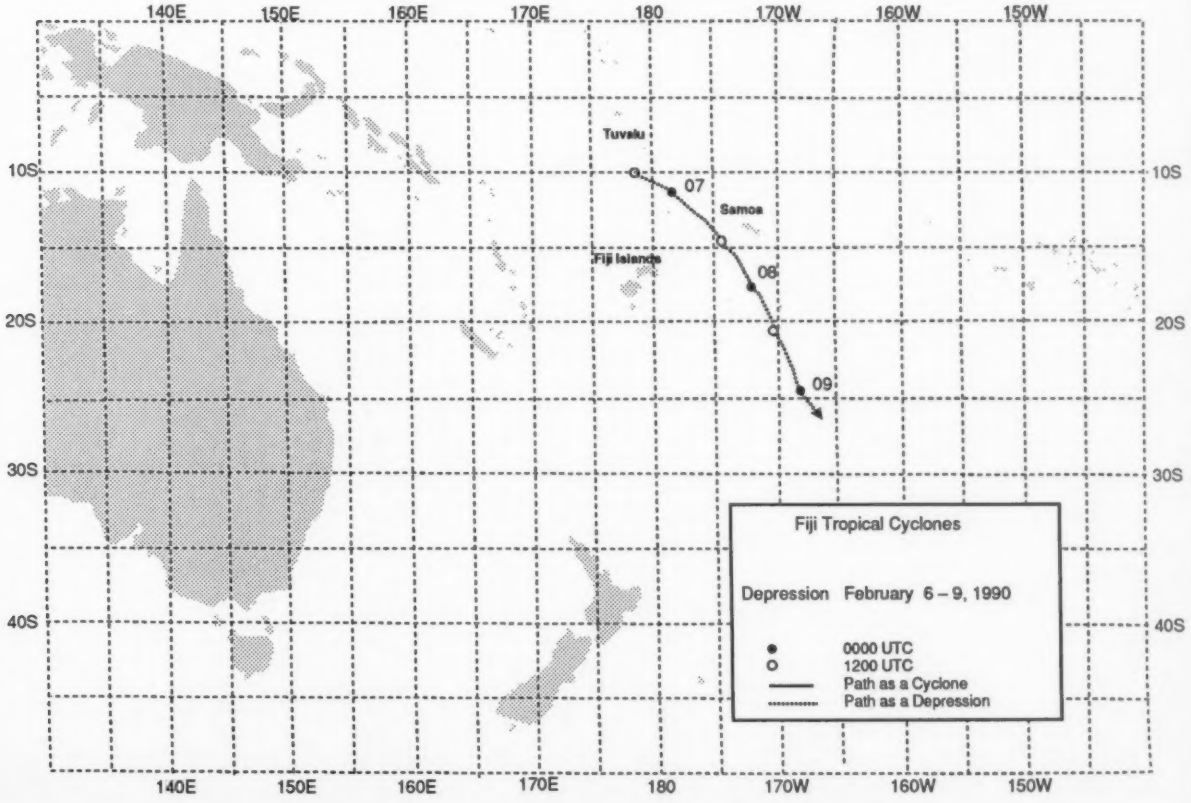
The South Pacific Convergence Zone (SPCZ) had been active for approximately 2 weeks prior to the formation of this depression on the 6th of February. In fact, during late January both the SPCZ and the north Australian monsoonal trough became active, spawning two tropical cyclones, Nancy and Ofa.

By 1200 UTC on the 6th, satellite imagery and surface observations clearly indicated that a new depression had formed near Tuvalu. At this time the new system was located downstream of a major upper trough and was soon steered southeastward by northwesterly flow on the eastern side of the trough.

By 1200 on the 7th, the depression had winds estimated at 35 knots in its eastern quadrant, although winds barely exceeded 15 to 20 knots to the west of the center. The system continued moving southeastward, following much the same track that Ofa had, passing between Western Samoa and the northern islands of Tonga and then very close to Niue on the 8th of February. All this occurred while strong upper level northwesterlies prevented further development and winds did not increase above marginal gale strength in the eastern sector.

After passing Niue, the depression continued on its southeastward track and was finally absorbed into the westerly flow.

The island of Vaitapo in Tuvalu reported that a number of houses were destroyed around 1200 UTC on the 6th. Apart from this, there was no damage attributable to this depression. It is possible that the damage to these houses was not directly caused by this depression, but may have resulted from strong and squally monsoonal northwesterlies prevailing over the northern islands of Tuvalu at that time. The island groups affected by this depression, namely Tuvalu, Samoa (Western and American), Tonga and Niue, had all been recently affected by Tropical Cyclone Ofa. As a result, assessing the damage is difficult.



North Atlantic Weather July, August, and September 1990

Unless otherwise stated all times are Universal (UTC). All miles are nautical miles. The number next to the storm summary corresponds to the same number on the track chart. The Monster of the Month is a title given to an extratropical storm that has been particularly hard on shipping. The tropical cyclones summaries are preliminary and based upon information provided by the National Hurricane Center, Joint Typhoon Warning Center, Central Pacific Hurricane Center, and the Hong Kong Royal Observatory.

July—The Azores–Bermuda High reigns supreme in July and 1990 was no exception.

The High(fig 1) was in its normal position, and the only anomalies were located southwest of Iceland where a mini Icelandic Low was analyzed, creating negative readings of up to 4 mb. The upper level pattern followed suit. North of 45°N, a slight counterclockwise bend was noticeable in the steering pattern; south of 45°N it was weak.

On this Date

July 23 1788— An early season hurricane swept the Atlantic south and west of Bermuda causing many ship disasters and then moved inland over North Carolina and Virginia. It passed directly over Mt Vernon, to which George Washington had retired. The weather was noted in his diary and this became known as George Washington's hurricane.

Ocean Weather

The month began rather peacefully with a large 1030–mb High covering most of the Atlantic. There was also a weak Low off Nova Scotia, and a moderate one over the British Isles. Eventually a front was analyzed from the southwestern U.S. to northwest Spain, and this served as a conduit for several small atmospheric waves as they traveled across the Atlantic during the 3d and 4th. One of these waves developed into a 982–mb storm.

❶ This storm was first detected on the 2d south of Kap Farvel. It looked like just another of the several weak waves until late on the 3d, when an identifiable circulation was found west of the British Isles. To the east of this system, a front in the Mediterranean was kicking up some winds as testified to by the ***Santa Regina*** and ***Lapad,*** which encountered 40–to 45–kn winds near 42°N, 7°E. At 1800 on the 4th, the ***Mintrop*** in the southern North Sea ran into 44–kn southerlies, which were verified 6 hr later by the ***Vigilant,*** when she reported 40–kn north northeasterlies just west of Scotland. On the 5th, reports of 40– to 45–kn winds came in from several vessels including the ***Galion, Cotinga,*** FNMS, and the C6IZ5. This pounding continued through the 6th, as the storm made its way across the North Sea and into Sweden. There were several reports in the North Sea of seas reaching 15 ft. The storm was soon out of harm's way, but in its wake came another.

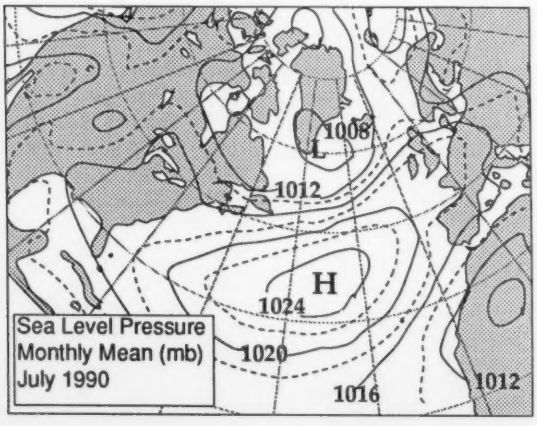
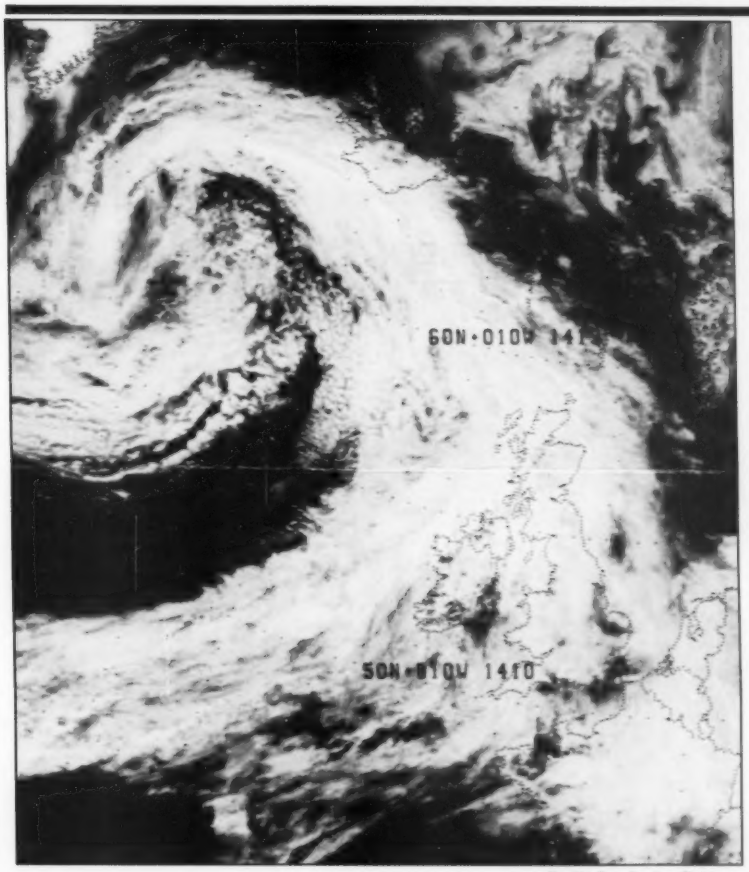


Figure 1.— The Azores–Bermuda High dominates the North Atlantic in July, and this usually results in good shipping weather along the northern trade routes. The analysis was provided by Vernon Kousky and John Kopman.

❷ This system can actually be traced back to the Gulf of Bothnia on the 1st. It intensified over Hudson Bay on the 3d, and emerged off Labrador as a 988–mb Low on the 5th. Moving east northeastward, the Bothnia Low intensified slowly. However, by the 7th, its central pressure had dipped to 976 mb as it



Satellite Data Services Division

Figure 2.— This storm was near its peak when this visual satellite photograph was taken at about 1400 on the 7th. Its associated cold front was also quite active.

approached the 60th parallel. Its associated frontal system was already generating gales to the south and southwest of the center (fig 2). Closer to home, the ***Vasiliy Surikov*** (52°N, 42°W) was nailed by 50–kn west southwesterlies in 16–ft seas, northeast of the center. The ***Pinro*** bucked 48–kn east southeast winds. Gales continued throughout the day, and were reported by such vessels as the ***Tumilco, Sea–Land Atlantic, Tyro, Viktor Lyagin*** and the ***Skogafoss.*** In general, seas were in the 10–to 15–ft range. The storm continued to cause problems on the 8th and 9th, as it headed into the Norwegian Sea and slowly filled.

While a third system followed behind the Bothnia Low, it lacked the intensity of Storm No. 2. By the 12th, the Azores–Bermuda High was being squeezed in its northwest quadrant by a 992–mb Low off Newfoundland.

❸ This storm came to life on the 6th near the Great Slave Lake in Canada's Northwest Territory. From this 10,000–sq mi lake, the developing system dipped southeastward across Lake Winnipeg, and then swung east northeastward over Hudson Bay. By the 9th, central pressure dipped to 990 mb, but then the storm filled somewhat as it moved across Quebec and Labrador. It stalled on the 12th and 13th southwest of Kap Farvel, and began to intensify once again. On the 14th its 984–mb center crossed the 30th meridian, but it recurved a short time later, and turned a large counterclockwise loop over the next several days. At 0000 on the 14th the ***Omisalj*** (50°N, 39°W) hit 40–kn westerlies. The C6IZ5 (47°N, 38°W) ran into 52–kn westerlies some 2 days later, and she also reported 50–kn northwesterlies on the 17th. Later in the day the H2SP caught 48–kn west northwesterlies along the front to the south of the center, which was filling as it made its way toward Iceland.

During the next weeks, several smaller centers traversed the waters between Newfoundland and Iceland but most of the ocean was under the influence of a double–centered Azores–Bermuda High. These all contributed to the Icelandic Low, which was apparent on the climatic chart. Meanwhile, in the tropics, an African wave that was to become tropical storm Arthur began to organize on the 23d. It then moved through the central Caribbean and attained 60–kn winds and a 995–mb minimum central pressure, before dissipating south of Hispaniola. Late in the month, Hurricane Bertha developed off the east cost of Florida from a tropical low that had formed southeast of Cape Hatteras. Bertha developed gradually and tracked northeastward, accelerating as it reached higher latitudes. Bertha had two periods of hurricane intensity. It generated maximum winds of 70 kn with a 974–mb pressure minimum, and maintained hurricane intensity until becoming extratropical off the Maritime Provinces.

Casualties

None were reported by any of our sources.

August— The center of the dominant Azores–Bermuda High was analyzed along the 45th parallel, near 40°W (fig 3). This was some 600 mi north of its normal position, and resulted in positive pressure anomalies of up to 4 mb east of Newfoundland. On the other hand, –4 mb anomalies over Iceland were caused by an increase in storm activity in this region, and resulted in a mid–summer Icelandic Low. In the upper atmosphere, steering currents were significant only north of 45°N and were nearly zonal. Over the Greenland and Norwegian Seas, the cyclonic influence was apparent, so that a storm over Iceland would tend to move northeastward on average.

On this Date

August 12, 1778— The French and the English were about to do battle in Narragansett Bay. The English under Lord Howe, off Point Judith, enjoyed a seasonal wind advantage. This was lost on the 10th when a wind shift to the north allowed the French to maneuver past the British. However, both navies soon suffered losses as a hurricane from the Carolinas blew up the New England coast on the 12th.

Ocean Weather

The major weather producer in the North Atlantic, as the month opened, was Hurricane Bertha (40°N, 65°W). Ships stayed away, but at 0600 the ***Dickson*** (43°N, 62°W) reported 43–kn easterlies while the ***Mason Lykes*** (37°N, 62°W) hit 40–kn westerlies 6 hr later; she was running in 16–ft swells at the time. By 1800, about a half dozen vessels were encountering 40–kn winds in seas up to 23 ft, mainly southeast of the center. Early on the 2d, the ULVZ hit 50–kn northwesterlies just south of Bertha's center. On the 2d Bertha moved through the Gulf of St. Lawrence as a tropical storm, and then became extratropical over eastern Quebec on the 3d.

At this time, a 1031–mb High was centered in the mid Atlantic, while a double–centered Low encompassed Iceland and the Denmark St. In the tropics, Cesar was beginning to kick up its heels. By the 5th, Tropical Storm Cesar was heading northwestward and approaching the 25th parallel near 45°W, while a tropical depression, soon to become Hurricane Diana, organized off Cabo Gracias a Dios, Nicaragua. The High was rather persistent and extended its influence northward into the Greenland and Norwegian Seas.

Tropical Storm Cesar encountered upper level westerly winds on its northwest flank. These winds not only prevented further intensification, but led to the storm's dissipation. Cesar's winds never climbed above 45 kn nor did its central pressure fall below 1000 mb. Meanwhile, Diana had organized into a minimal hurricane, by the 7th, after crossing the Yucatan Peninsula and heading across the Bay of Campeche and southern Gulf of Mexico. Maximum winds climbed to 85 kn, while minimum pressure dipped to 980 mb before it moved inland over Tampico, Mexico on the 8th.

While Diana was making a splash in the Gulf of Mexico, a persistent frontal wave a few hundred miles west of the Azores began to organize when deep convection broke out near its center. This system developed over water with a temperature less than 23°C, making it a hybrid middle latitude subtropical system. Maximum winds climbed to 45 kn with an estimated minimum pressure of 1000 mb. The system skirted the Azores on the 9th and 10th as it headed eastward. During this period, a Low developed over southern Greenland and headed eastward.

❶ This storm came to life near Julienhaab, Greenland on the 8th. After crossing the southern tip of Greenland, it intensified into a 990–mb storm the following day. At 0000 on the 10th, the ***OOCL Challenge*** came in with 30–kn west northwesterlies, while fighting 12–ft seas, about 500 mi south of the 995–mb center. The following day the storm took a northward turn and slowly began to fill, while its associated cold front moved across the British Isles. By the 14th, the center was heading for the Arctic Ocean.

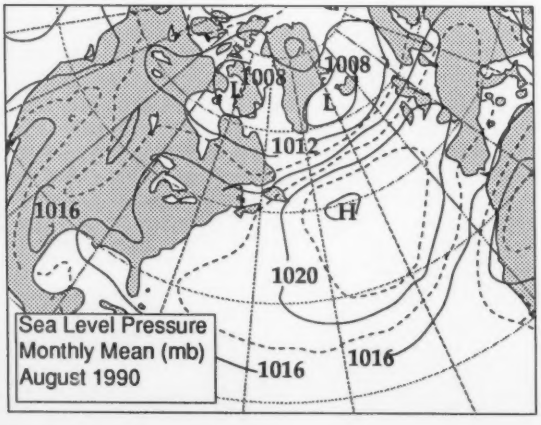


Figure 3.— The Azores–Bermuda High was north of its normal position in August. The other notable feature was the Icelandic Low, which resulted from above normal extratropical cyclone activity. The analysis was provided by Vernon Kousky and John Kopman.

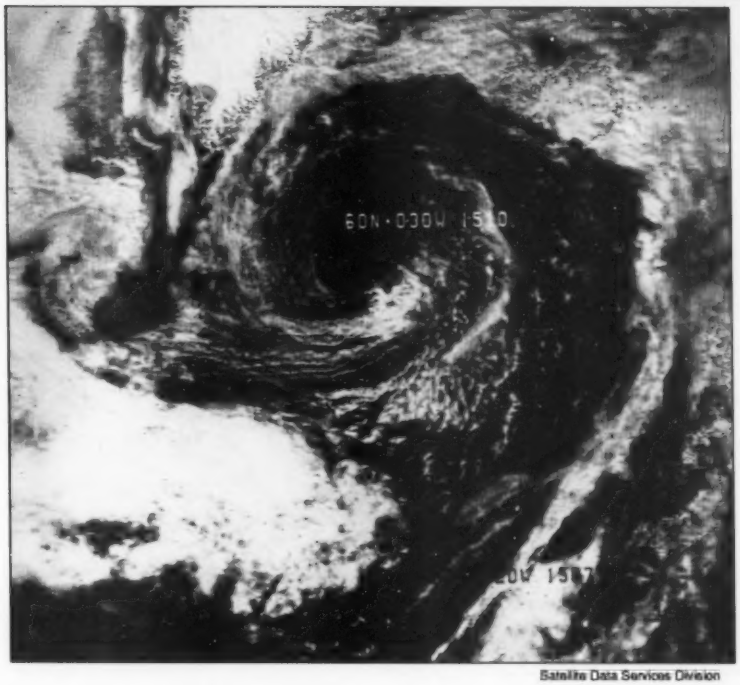


Figure 4.— At this time, about 1500 on the 26th, this extratropical cyclone had been stalled for some 24 hr, but was deepening and causing problems for shipping over the northern routes.

Far to the south, Tropical Storm Fran put in a brief appearance. It formed near 10°N to the east of the Windward Is. Maximum winds of 35 kn were maintained only on the 14th, and it was quickly destroyed by strong vertical wind shear.

On the 16th, a moderate Low intensified off the coast of Norway. Its circulation combined with a 1033–mb High over the Azores, for a day, generating 15–to 20–kn winds across the British Isles and in the North Sea. On the 21st and 22d, a 979–mb Low created some strong winds in and south of the Denmark St. Most were below gale force, however, and the system moved quickly into the Greenland Sea, where it filled. A couple of days later Gustav was spotted in the tropics, near 12°N, 46°W. Right behind was a tropical depression that would soon become Hortense. Gustav became the season's most intense hurricane. It moved northward and reached peak intensity on the last day of the month, when maximum winds were estimated at 105 kn with a 956–mb pressure. Gustav existed at hurricane intensity for about 7 days, which carried it into September. Meanwhile, Hortense turned northward as well, but farther to the east. It moved northwestward on the 28th, when maximum winds climbed to 55 kn and central pressure dipped to 993 mb. It fell to depression strength as the month ended.

❷ One other extratropical system was worth noting. On the 24th, near 55°N, 40°W, a Low occurred. It headed northwestward but stalled for 24 hr from the 25th to 26th. During this period, it deepened into a 980–mb storm. The KNDB, at 0000 on the 26th, hit 40–kn westerlies about 150 mi south of the center. She was battling 26–ft swells at the time. The storm finally began to move and, after a southeastward jog, it turned toward the east northeast on the 28th. Its associated cold front was generating 20–to 25–kn winds south to about 45°N. At 1200 on the 29th the JMLC ran into 40–kn northwesterlies in 12–ft swells near 56°N, 24°W. The storm center moved north of Scotland on the 31st, and weakened considerably.

Casualties

The ***Georgios*** suffered heavy weather damage at Aegina, Greece on the 23d. See September Casualties for damage suffered in Gustav.

September— This is usually a season of change as the Azores–Bermuda High slowly retreats and weakens while the Icelandic Low begins to take shape. It is also the most active month in the tropics, on average. This year the Azores–Bermuda High was not willing to give in (fig 5). The result was a large area of positive anomalies, up to 10 mb, over the northern shipping lanes. Even a weak high over Greenland was much stronger than normal, and a rather anemic Icelandic Low could be found over the Greenland Sea. The upper level steering patterns were oriented in general toward the east northeast, but turned abruptly northward over the Norwegian Sea.

On This Date

September 3, 1913— The six–masted schooner ***George W. Wells***, of Boston, was struck by hurricane winds off Cape Hatteras, lost her sails, became partially filled with water, and drifted into the breakers between Ocracoke and Hatteras

Inlet. She became the largest sailing ship ever wrecked on the North Carolina Coast. All hands were rescued. (from *Graveyard of the Atlantic* by David Stick).

Ocean Weather

Hurricane Gustav was on hand to open September, near 35°N, 55°W. The ***Lori E*** can testify to this, as she was rocked by 72–kn south southeasterlies at 1800 on the 1st near 35°N, 52°W. At 0000 on the 2d, as Gustav approached a frontal system, the ***Galion*** (42°N, 53°W) experienced 70–kn north northeasterlies in 16–ft seas. She continued in these conditions throughout the day as the wind direction backed to westerly. Finally on the 3d (42°N, 48°W), her winds dropped to 50 kn and swells were running 13 ft. By this time Gustav had become extratropical and turned northeastward. The storm was also weakening, but maintained its identity long enough to make it to the North Sea by the 6th. It actually became the southernmost of a trio of low pressure centers, with the other two located on either side of Iceland on the 4th and 5th.

By this time, Tropical Storm Isidore had developed from an African wave. Isidore moved northwestward, eventually recurving to the northeast as an extratropical storm. It stayed east of 55°W, and remained a hurricane from about the 7th to the 15th. Maximum winds reached 85 kn with a minimum pressure of 978 mb. On the 9th, at 1200, the ***Super Servant 4*** ran into 47–kn northeasterlies in 16–ft seas near 29°N, 44°W. As Isidore crossed the 35th parallel, on the 13th, it recurved toward the north then northeast. It remained tropical in nature until the 17th. At 0000 on the 16th, the ***Raleigh Bay*** ran into 45–kn southeasterlies near 41°N, 47°W. She was battling 25–ft swells at the time, and reported a 986–mb pressure. Twelve hr later, the DDQS battled 42–kn westerlies about 200 mi south of the center. The following day this storm weakened rapidly as it turned toward the east southeast.

❶ While Isidore was developing in the tropics, there was also some action in the north. A storm formed off Labrador on the 6th, but didn't really intensify until it made its way into the Denmark St on the 9th. The central pressure fell to 972 mb, and several vessels were fighting gales. At 1800, the NRUO in 18–ft seas reported 46–kn west southwesterlies near 60°N, 39°W. Six hr later, her environment was much the same. At 1200 on the 10th, the ONBU (50°N, 30°W) was blasted by a 58–kn northerly. However, the system was filling and by the 11th was just a run–of–the–mill low in the Greenland Sea.

❷ **Monster of the Month**

A potent extratropical storm came to life on the 17th, a few days after Isidore died. It was actually traced back to near Calgary on the 12th, but had its real beginnings off Kap Farvel, Greenland. By the 18th, it had moved south of Iceland and was sporting a 976–mb center. Its potency was testified to by the ***Valur*** at 1200, near 63°N, 19°W, when it reported a 52–kn northeast wind and a 972–mb pressure. A few hours later, everyone was getting into the act. This was a violent system. At 1500 the OUNM2, ***Isnes,*** and ***Valur*** reported winds in the 50– to 60–kn range, while the ***Reykjafoss*** (63°N, 17°W) hit 68–kn northeasterlies. She also recorded a 966–mb pressure, and the storm's central pressure was estimated at 960 mb by 0000 on the 19th. By 1800 on the 18th, storm force winds were being felt by the ***Isle of Arran, Sovetskiy Moryak, Isnes, Haukur, Valur,*** and the ***Purga***; the ***Isle of Arran*** (56°N, 5°W) led the parade with 65–kn southerlies. The ***Haukur*** (63°N, 14°W) hit 60–kn northerlies and recorded a 964–mb pressure. This storm was bringing some rough weather to the British Isles as well, as it headed into the Norwegian Sea. Storm force winds continued through the 19th over the northern North Sea and Norwegian Sea, while gales reached into the southern North Sea and English Channel

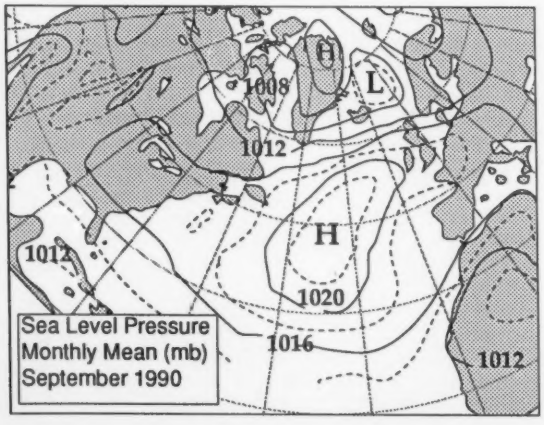


Figure 5.— The Azores–Bermuda High was not willing to give in to the winter takeover of low pressure systems, and the Icelandic Low without a fight. The Icelandic Low remained relatively dormant as it is in summer. The analysis was provided by Vernon Kousky and John Kopman.

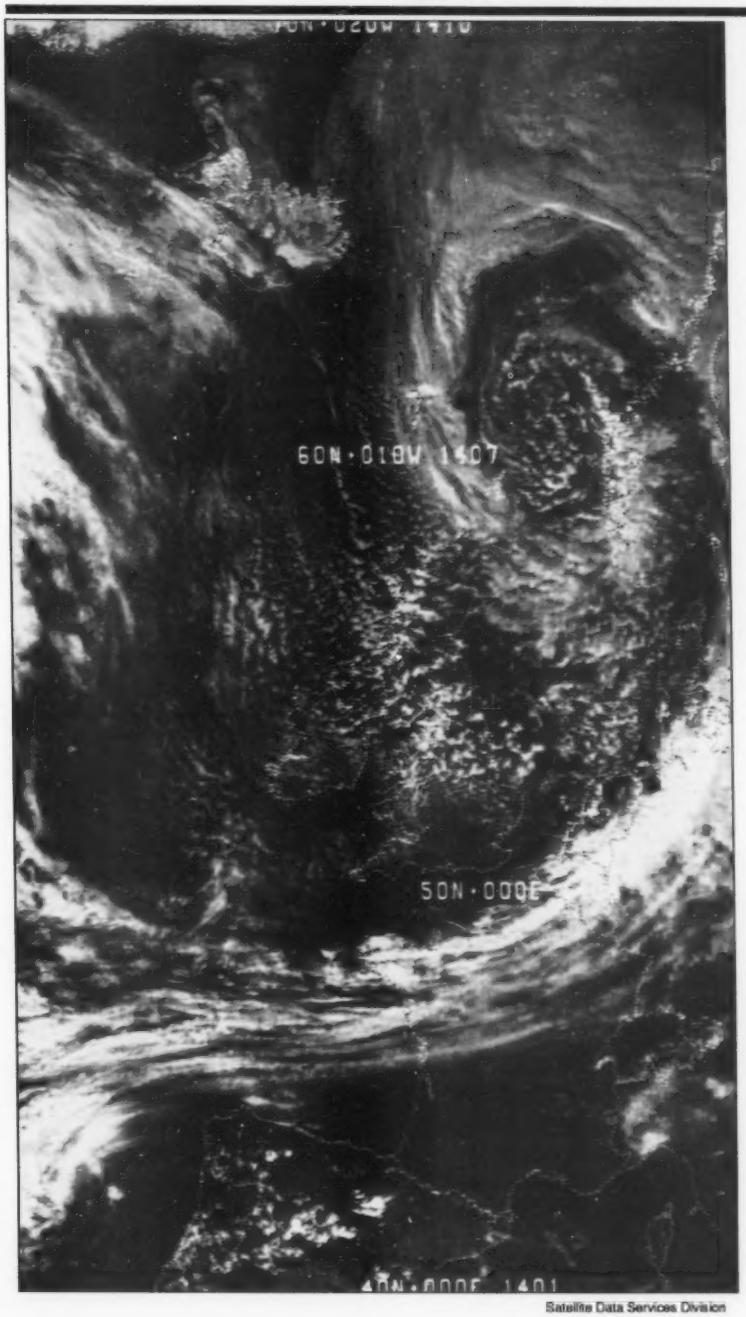


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Figure 6.— The Monster of the Month, on the 19th of September, at about 1400, was generating storm force winds over the North and Norwegian Seas. It also caused rough weather in the British Isles and its front swept across the Bay of Biscay.

(fig 6). There was little let–up for the next several days as the system slowed and developed another center.

❸ On the 24th this system developed as a wave along a front. The following day it organized into a storm. By 0000 on the 25th, the ***Akedemik N Vavilov*** encountered 35–kn winds some 300 mi southeast of the center, which was west of the Bay of Biscay. At 1800, a report of 66–kn northwesterlies came in from the KRBVS; this seemed a little strong. The ***Spring Bear*** (43°N, 23°W) hit 40–kn northeasterlies in 13–ft seas at 0600 on the 26th. By this time, the 987–mb system had turned toward the south southwest and crossed through the Canary Is. Six hr later, the ***Spring Bear*** had reported winds of 48–kn in 16–ft seas. These continued throughout the remainder of the day. This was a potent extratropical storm for these waters. Several vessels reported gale force winds on the 26th and into the 27th. It began to weaken late on the 27th. The month came to a close with several Lows over the northern shipping lanes and the beginnings of Hurricane Josephine in the tropics.

Casualties

On the 4th, an intense thunderstorm, with sustained winds of 40 kn, tore through downtown Mobile pushing the Alabama State Docks container crane along its rails and into a parked truck. The crane derailed and its boom struck the bridge of the container vessel ***Star Evviva***. A week later in another thunderstorm, the ***Omi Wabash*** broke her moorings at Chickasaw, AL and was driven aground. The ***Raseltin*** was surveyed at Port Arthur, Tx for damage allegedly sustained in heavy weather on the 31st of August and 1st of September, while enroute from Alexander in ballast.

North Pacific Weather July, August, and September 1990

July – The subtropical high (fig 1) dominated a good portion of the North Pacific in July.

While there were several minor anomalies, the only significant one was a –4 mb anomaly in the Bering Sea, which shows up as a trough or sort of indentation on the climatic chart. It is also reflected in the upper atmosphere as well, where the steering patterns are nearly zonal west of 160°W and curve cyclonically over the Gulf of Alaska.

On this Date

July 21, 1957— Hurricane Kanoa reformed and was spotted thanks to a report by a vessel, ***Cape Horn***, near 15°N, 130°W. She encountered 58–kn winds in very high seas with precipitous swells. The ***Cape Horn*** remained near the periphery of the storm for the following 4 days rendering invaluable aid in charting its course and intensity.

Ocean Weather

The month opened with a large 1032–mb High centered near 35°N, 160°W. There were three low pressure systems skirting its northern flank and producing winds of 20 to 30 kn along the northern shipping routes. A couple of tropical depressions were detected over the eastern North Pacific and Robyn was developing in the west.

Robyn began as a tropical depression about 115 mi east northeast of Yap Is on the 5th. Robyn had an extensive circulation but intensified rather slowly, and required 3 days to reach tropical storm strength. After passing within about 190 mi of Yap, Robyn turned northward. Its outer rainbands affected Taiwan, and it maintained tropical storm intensity while moving up the East China Sea. It finally degenerated into an area of low pressure over the Sea of Japan on the 12th. Meanwhile, in the east, Fausto became a tropical storm on the 7th, some 300 miles south southwest of Acapulco, Mexico. The system was briefly upgraded to a hurricane with estimated winds of 74 kn. It fell back to a tropical storm, some 400 mi west of Cabo San Lucas, and then dissipated on the 13th. Genevieve, in the meantime, had come to life on the 11th. It reached tropical storm intensity on the 13th near Socorro Is, and hurricane strength as winds climbed to 90 kn. On the 16th it turned toward the northwest and began to weaken as it moved into an area of strong shear and cooler water temperatures.

During these first 2 weeks, north of the nearly–permanent subtropical high, low pressure systems moved in and out of the Bering Sea, and occasionally one would reach the Gulf of Alaska. About the time Fausto was threatening Baja California, a 983–mb Low moved

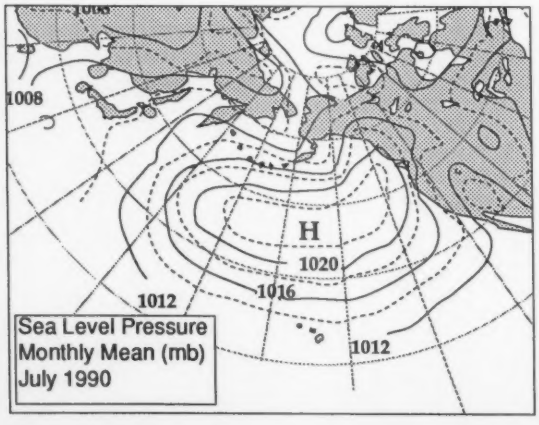

Figure 1.— The subtropical high dominates a good portion of the North Pacific in July and this usually results in good shipping weather along the northern trade routes. The analysis was provided by Vernon Kousky and John Kopman.

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Figure 2.— Storm No. 1 can be seen here at 2200 on the 9th, as it nears the coast of British Columbia.

toward the Gulf of Alaska.

❶ This Low originated near 35°N, 160°E on the 4th. Heading northeastward, it didn't really get organized until the 7th, and it wasn't until late on the 9th that the ***Westwood Venture*** (58°N 146°W) reported a 40–kn easterly. By this time the storm was beginning to slow as it moved north northeastward (fig 2). In general, winds were in the 20–to 30–kn range. On the 10th, the system jogged eastward and began to fill rapidly.

On the 17th, high pressure pushed its way into the Gulf of Alaska, and forced most of these weak lows into the Bering Sea. In the tropics, Hernan began as a tropical depression some 565 mi southwest of Acapulco on the 19th. Another depression trailed behind and eventually became Iselle. Hernan reached hurricane strength on the 21st, and became one of the strongest storms in recent years in the eastern North Pacific (fig 3). On the 24th, a concentric eyewall pattern was visible on the infrared satellite image. Peak winds were estimated at 135 kn and winds of 100 kn or more were evident for 4 days. Hernan dissipated on the 31st. Meanwhile, Iselle reached hurricane strength on the 22d, while remaining in close proximity to Hernan. By the 25th, its maximum winds were estimated at 105 kn around a 958–mb central pressure. Iselle moved on a general west northwesterly track and dissipated over cooler waters on the 30th.

Things were hopping in the western tropics as well. Typhoon Steve developed as a tropical depression, some 340 mi north northwest of Guam, late on the 25th. It reached tropical storm strength the following day as it moved northeastward. After turning northward, it peaked on the 29th, when winds climbed to 110 kn near its center. After passing 200 mi east southeast of Iwo Jima that day, it turned northeastward, before accelerating and weakening over the central North Pacific. Tasha formed over the northwest South China Sea, some 175 mi east southeast of Dongsha. It gradually intensified to a severe tropical storm over the next 2 days, while drifting westward. Tasha made landfall over the coast of eastern Guangdong, about 85 mi east northeast of Hong Kong on the 31st. Two days earlier Vernon came to life some 900 mi east northeast of Manila. It intensified over the next few days, and reached typhoon strength on the 31st about 285 mi southwest of Iwo Jima. Later that day Vernon turned north northeastward and accelerated. The typhoon tracked northward until the 4th, when it began to turn east northeastward. It became extratropical on the 8th some 840 mi east northeast of Tokyo.

In the northern ocean, storms, for the most part, continued to be shunted into the Bering Sea. The month closed nearly as it had opened with the exception of the increase in tropical cyclone activity.

Casualties

Tasha caused severe damage due to heavy rain and flooding in Guangdong and Fujian provinces. In Fujian 69 people were killed, while 39 people lost their lives in Guangdong. In total, more than 35,000 homes were destroyed.

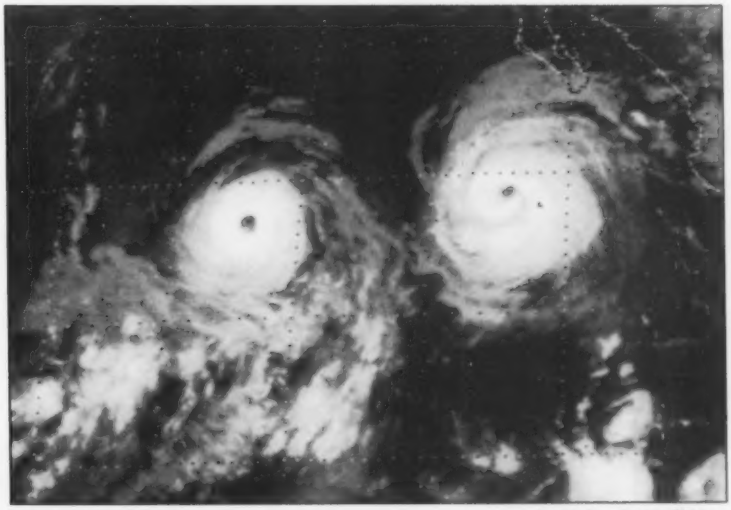

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Figure 3.— Hurricane Hernan (left) is trailed by Hurricane Iselle at 1430 on the 25th. Hernan, with 135–kn winds, was one of the most powerful storms in recent history in this region.

August— At first glance it looks like a normal summertime climatic chart (fig 4) over the North Pacific. However, upon closer inspection, what is an identifiable Aleutian Low doing over Kamchatka? It's the result of more storms than normal in the western Bering Sea, including contributions from the extratropical stages of former tropical cyclones. Upper air currents are nearly zonal, although more cyclonic in the Bering Sea.

On This Date

August 3,1941— The eye of a typhoon passed off the northern end of Guam. At Agana, a minimum pressure of 969.9 mb was recorded along with a wind gust of 108 kn. A maximum 48–hr rainfall total of 12.42 in was measured during the passage.

Ocean Weather

Typhoons Vernon and Steve greeted August in the western North Pacific. Steve, which was moving northeastward in late July, took a northerly track on the first day of the month and weakened to a severe tropical storm about 900 mi east of Tokyo. It accelerated northeastward the following day and turned extratropical. The ***Maritime Associate*** (53°N, 163°E) hit a 45–kn easterly at 0000 on the 3d. On the 4th, as the storm made its contribution to the Aleutian Low, the ***Sanko Prelude, Anitoliy Kolensnichenko, Globus,*** and the VRAOZ were belted by 40– to 50–kn winds in swells up to 20 ft. They were about 200 to 250 mi south of the center at the time. The following day the storm turned eastward and slowed. It began to fill on the 6th.

In the meantime, Vernon, which had been moving northward, turned east northeastward on the 4th, when it weakened from a typhoon to a severe tropical storm, some 175 mi southeast of Tokyo. It turned northward on the 6th, and became extratropical 2 days later. It too made a contribution to the Aleutian Low, on the 9th.

Also on the 9th, ex–Vernon was off Kamchatka, a weak Low was just southeast of the Gulf of Alaska, Typhoon Winona was moving in on Japan, and Tropical Storm Aka was developing in the central North Pacific. Most of the middle latitudes were covered by a 1028–mb High. Winona had formed some 600 mi south southwest of Tokyo on the 7th, and attained typhoon strength on the 9th, 225 mi south southwest of Tokyo. It crashed over southeastern Honshu the next day. Once inland, it weakened, and finally turned extratropical over the Kuril Is on the 11th. Tropical Storm Aka crossed the International Dateline on the 13th about 800 mi east southeast of Wake Is. Moving west northwestward, it weakened to a depression by the 15th, and dissipated later in the day some 150 mi east southeast of Wake.

By this time, Yancy had already developed about 800 mi north northeast of Guam. It followed a meandering track in the general direction of Taiwan, for the next several days. It attained typhoon intensity 400 mi southeast of Taipei on the 17th. After crossing the Ryukyu Is, Yancy recurved and hit Taiwan on the 19th (fig 5). It made a loop over the Island before crossing the Taiwan St that night. Yancy made landfall over northern Fujian, about 40 mi south southeast of Fuchou, on the 20th, and weakened to a severe tropical storm. It dissipated by the 23d.

While Yancy was approaching the Ryukyu Is on the 18th, Zola popped up 300 mi north of Guam. It was a typhoon by the 20th and hit western Japan on the 22d. It dropped to tropical storm strength before moving into the Sea of Japan on a northwestward track. On the 23d, Zola became a tropical depression off southwestern Hokkaido and dissipated a short time later.

There was no let–up as Abe came to life, on the 25th, 85 mi west southwest of Guam. Moving northward then west northwestward, Abe reached severe tropical storm strength on the 28th and became a typhoon the following day about 425 mi east southeast of Taipei. Abe moved across the Ryukyu Is and then made landfall about 150 mi south of Shanghai on the last day of the month. The western Pacific was still not finished as Becky reached typhoon strength over the South China Sea on the 27th. It moved westward and weakened to tropical storm strength just

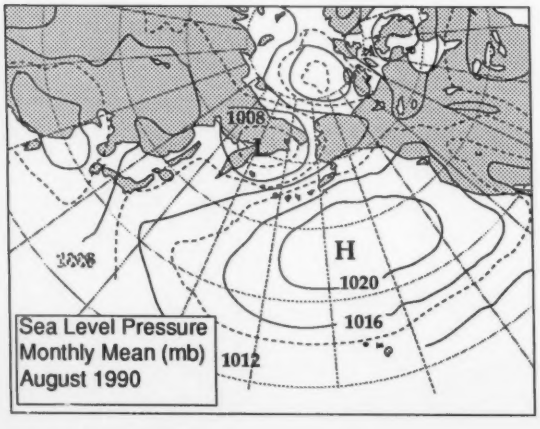

Figure 4 .— Note the Aleutian Low's positioned over the Kamchatka Peninsula. This is an indication of where the action was in the North Pacific this month. The analysis was provided by Vernon Kousky and John Kopman.

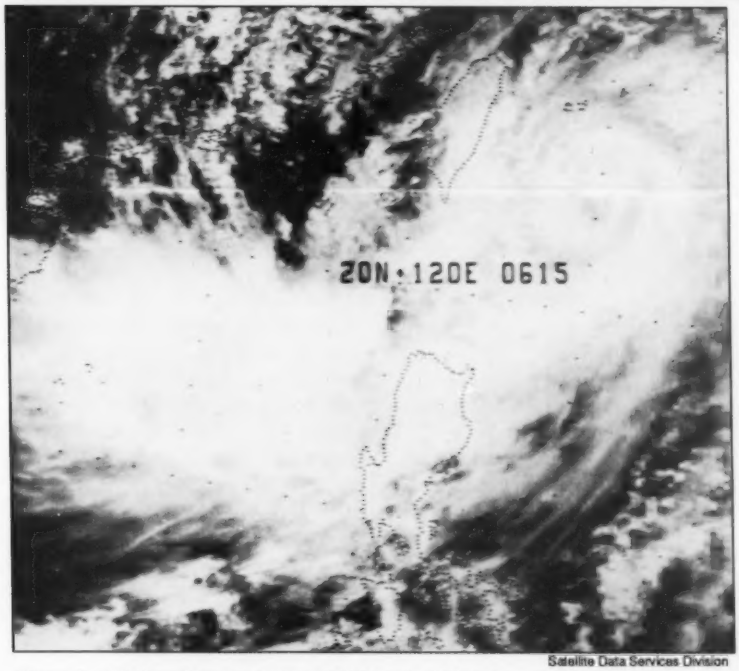

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Figure 5.— Typhoon Yancy is spotted at 0600 on the 18th just east of Taiwan. It is in the process of recurving and is about to hit the island.

before landing over central Vietnam on the 29th.

The tropical eastern North Pacific was less active than normal in August. Julio began as a depression on the 17th, some 400 mi south of Acapulco, Mexico. Moving west northwestward, it reached hurricane strength on the 19th and it peaked on the 21st, when maximum winds climbed to 100 kn around a 960–mb pressure center. Julio fizzled shortly after moving into the central Pacific on the 24th.

Kenna was already a tropical storm by the 24th, and reached hurricane strength the following day, near 15°N, 128°W. Maximum winds were estimated to have hit 74 kn before it turned toward the north and moved over cooler waters. On the 23d, Lowell organized into a tropical depression, and then became a tropical storm on the 25th, some 220 mi south southwest of Puerto Vallarta, Mexico. Lowell turned westward and reached minimal hurricane intensity about 290 mi southwest of Cabo San Lucas 2 days later. However, on the 28th, it was downgraded to a tropical storm and dissipated a few days later.

❶ This was one of the few moderate extratropical storms that didn't originate as a tropical cyclone. It developed as an atmospheric wave along a front just off northern Honshu on the 17th. The system moved northeastward and intensified slowly. By the 19th, it crossed the 50th parallel near 156°E with a 984–mb center. At 1200, the ELJL3, about 300 mi south of the center, encountered 40–kn west northwesterlies while battling 15–ft swells. The storm's central pressure dipped to 974 mb by 0000 on the 20th. The JEMQ3 was hitting 35–kn winds in 16–ft seas south of the center, which soon to swung northward. It remained potent through the 21st.

Over the eastern North Pacific, a large semi–permanent High had settled in and intensified. By the 26th, its central pressure was a whopping 1042 mb. A Low in the Bering St trailed a stationary front to the south, and the gradient between it and the High was very tight. At 0000, the ***Westwood Anette*** reported a 35–kn southerly near 48°N, 176°W. A relatively long north–south fetch was apparent and some vessels were encountering swells up to 20 ft east of the Alaska Peninsula. Conditions eased on the 27th, and the month closed with Typhoon Abe and Tropical Storm Lowell as the most potent weather producers.

Casualties

In the Philippines, two ships capsized in rough seas whipped up by the extensive circulation of Yancy, resulting in six people killed and four missing. Over mainland China, Yancy was responsible for taking 265 lives. During the passage of Zola over Japan, three people were killed. Becky was also a devastating typhoon. In the Philippines there were 103 people killed, mostly by landslides and floods. As the storm crossed the South China Sea the ***Alphard*** and another vessel vanished in high seas, with a total of 35 crewmen lost between the two ships. Becky was also responsible for 15 deaths in Vietnam, while in Hong Kong a teenage swimmer was reported missing in rough surf. Typhoon Abe left 108 people dead on mainland China and 85 people lost their lives in the northern Philippines.

The bulk carrier ***Jay Bola*** sustained damage on the 18th during Yancy, while the ***Scandutch Asia***, from Taiwan to Hong Kong, lost eight containers overboard.

September— A potent Aleutian Low, along with a strong subtropical high that was farther north than normal, made for a rough September in the Gulf of Alaska and over the northeast North Pacific (fig 6). The Aleutian Low's intensity resulted in pressure anomalies of down to –6 mb over the Alaska Peninsula while +2–mb anomalies were analyzed over southeastern Alaska. In the upper atmosphere this trend was reflected in the steering patterns, which showed a trough over the Bering Sea. In the western ocean the currents were out of the west northwest turning toward the northeast at about 170°W. This would tend to move a storm from Hokkaido toward the east southeast and then northeastward so it would end up near the Queen Charlotte Is.

On This Date

September 23, 1843 – The *Lark*, a German vessel, logged a storm at 15°N, 139°W, which was later charted at 17°N, 147°W. On this heading it would have come ashore over the southeast coast of the Big Island of Hawaii. However no further records are available. William Redfield in a communication to Commodore Perry named the storm "The Cyclone of the *Lark*."

Ocean Weather

The month opened with Tropical Storm Abe over the Yellow Sea, a 992–mb Low over the central Aleutians and several high pressure centers dominating the rest of the Pacific.

Although several lows came to life in the northern waters, the first weather event of note in September was the formation of Dot in the Mariana Is. By the 6th, it was a typhoon and threatening Taiwan and the northern Philippines. Dot made landfall over eastern Taiwan on the night of the 7th and crossed the Taiwan St. the next day. It weakened to a severe tropical storm before making landfall near Xiamen.

Cecil began as a low pressure area just east of Taiwan and became a tropical depression just a few hours after the formation of Dot. Moving northwestward, it rapidly intensified to tropical storm strength. However, Cecil made landfall near Wenzhou late on the 4th and dissipated over land the next day.

On the 10th, Ed developed some 360 mi north of Guam and headed westward. It crossed the Balintang Channel on the 14th, and became a typhoon over the South China Sea the following day. Ed traversed the northern waters of the Sea, passing about 40 mi south of Xisha on the 17th. It weakened to a severe tropical storm about 30 mi north of Danang late on the 18th, and made landfall as a tropical storm about 115 mi south of Hanoi on the 20th.

Flo formed in the vicinity of Guam on the 13th, and moved northwestward. By the 15th, it hit typhoon strength some 425 mi southeast of Okinawa. It recurved northeastward after passing about 65 mi south of Osaka late on the 19th. Flo accelerated and weakened to a severe tropical storm, before moving out into open waters.

Several minor low pressure systems developed over the central Pacific during the first 2 weeks, but none dominated. On the 9th, for example, a large system, with three identifiable centers, stretched from the Alaska Peninsula southwestward to 160°E.

A few reports of near gale force winds were received and weather conditions were messy along the northern routes, but nothing out of the ordinary.

By the 13th, a subtropical High, with two centers, covered a good portion of the Pacific south of 40°N, and actually extended northeastward to Vancouver Is. The tropics, however, were far from quiet. In the east, Hurricane Marie was moving into the central North Pacific with Tropical Storm Norbert toiling east of Baja California, while Tropical Storm Ed and a tropical depression that would soon become Typhoon Flo were roaming the western waters.

Marie, which became a tropical storm on the 8th, intensified to generate 120–kn winds by the 11th (fig 7). The hurricane moved westward, but before hitting the Hawaiian Is, turned toward the southwest and dissipated. Norbert

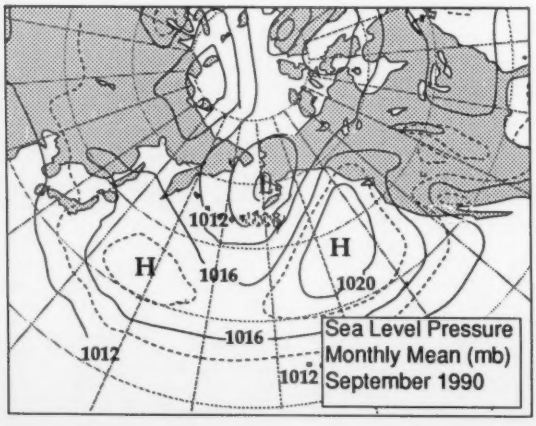
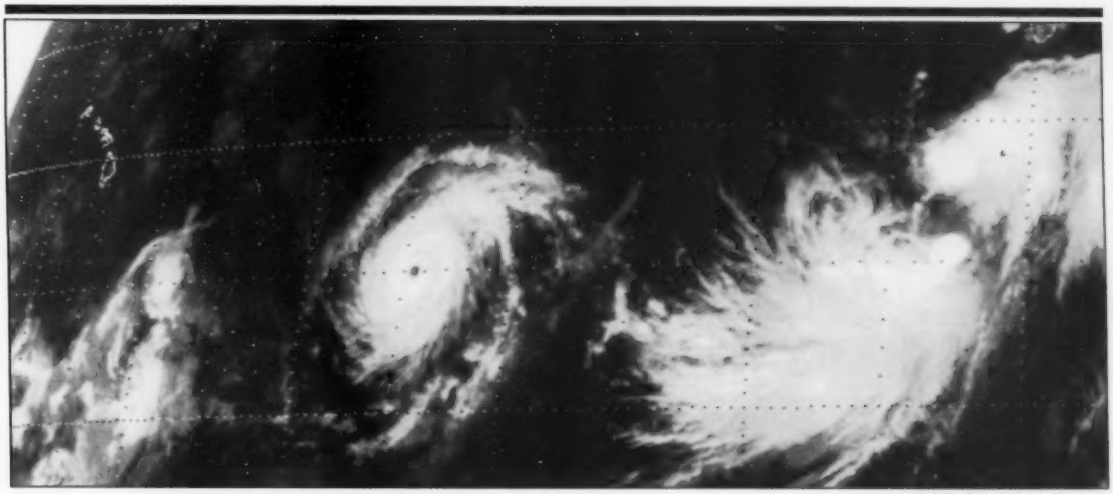


Figure 6.— The Gulf of Alaska had a rough month as the subtropical high squeezed up against the Aleutian Low. This can be interpreted as a month with tight pressure gradients in this region, which resulted in stronger than normal winds. The analysis was provided by Vernon Kousky and John Kopman.



Satellite Data Services Division

Figure 7.— This was the scene over the tropical eastern North Pacific on the 11th of September. Southeast of the Hawaiian Is and stretching westward was the Intertropical Convergence Zone (ITCZ). The well-developed storm was Hurricane Marie, just reaching peak intensity. Southeast of Baja California was Tropical Storm Norbert, which had yet to organize.

began as a depression on the 10th, and became a minimal hurricane on the 14th. It developed an eye for a short time on the 15th, but weakened and dissipated as it moved over cooler waters by the 19th.

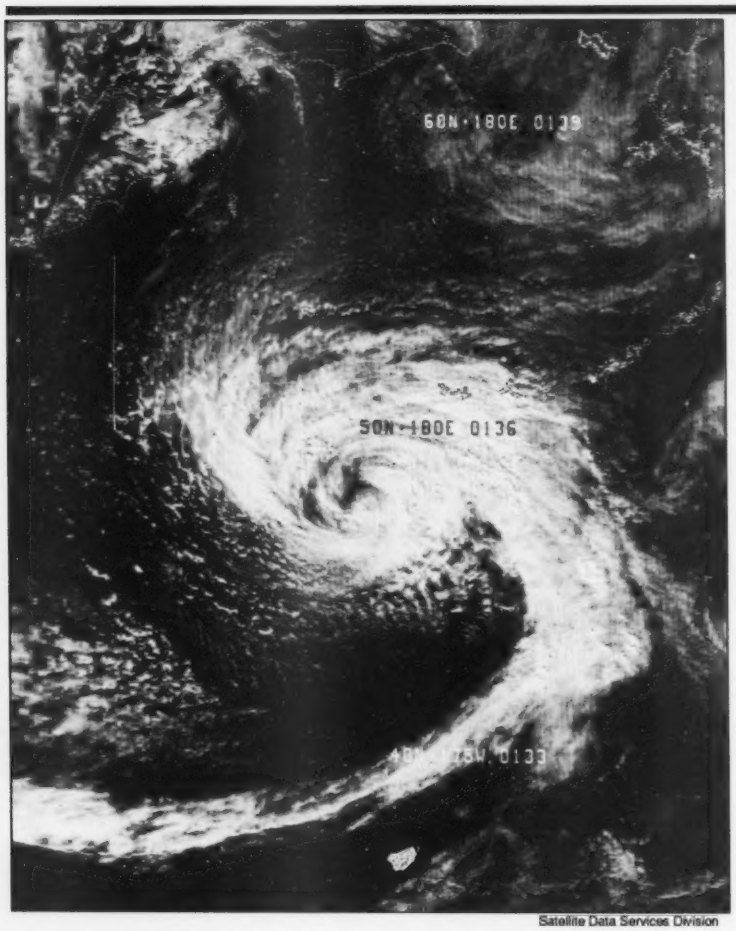
❶ Extratropical excitement picked up on the 21st, when ex Typhoon Flo reached that stage near 45°N, 160°E. Flo was a 976-mb Low and, along with a trailing cold front, generated gale force winds. Even a storm-force 55-kn wind was encountered by the 3ERRE some 100 mi southwest of the center, at 0000 on the 21st. The storm headed northeastward on the 22d, sporting a 968-mb center (fig 8). The ***Tonci Topic***, just 120 mi south of the center at 0000, was blasted by 55-kn westerlies in 20-ft seas. Several other ships, farther south, ran into 30-to 40-kn winds behind the cold front, where swells were reaching 20 ft as well.

As the system approached the Alaska Peninsula the following day, it began to fill, but was still a 978-mb storm at 1200 on the 23d. It weakened a lot more as it moved ashore on the 24th.

While Gene and Odile were roaming the tropics during the last week of the month, a potent Gulf of Alaska system was developing.

❷ This system was first detected on the 25th, as a wave, along a stationary front, near 40°N, 160°E. A 25-kn northwest wind report by the ***Century Highway No 2*** added to the evidence that an identifiable circulation was forming. For several days the system was overshadowed by a Low along the Aleutians. That Low had formed over Sakhalin on the 22d and moved eastward. By the 27th, the Sakhalin Low had turned northeastward and deepened to 970 mb. At 0000, the ***Miller Freeman*** (53°N, 171°W) was battling 50-kn west northwesterlies, while southeast of the center the ***Fiora Topic*** and ***President Grant*** were reporting 45-kn east southeasterlies. The ***Neptune Ace*** (54°N, 174°W) hit 46-kn winds in 23-ft swells. Six hr later the DZUT (57°N, 153°W) ran into 55-kn winds. Gales continued into the 28th. However, at 1200 on the 28th, the ESP3 (54°N, 138°W) reported a south southeasterly at 50 kn with a 978-mb pressure, while battling 40-ft seas. This was too far east to be the Sakhalin Low, which was already filling by this time. It turned out to be the low from the stationary front, which had played a secondary role up to this point. Was this just a questionable observation or did the secondary center intensify rapidly? At 1800, the ***Westwood Venture*** WMCV, and KGTY, in the vicinity of 53°N, 135°W, all reported 40-to 45-kn winds in 10-to 25-ft swells. This was some indication that the second system had, at least, taken over. However, it was just about inland at that time and began to weaken. Still, at 2100 on the 28th, the ***Westwood Venture*** battled 50-kn winds in 32-ft swells near 54°N, 136°W.

On the 23d, Hurricane Odile was found as a tropical depression, some 750 mi south southeast of the southern tip of Baja California. Across the Pacific, Gene came to life about 650 mi south southeast of Okinawa that



Satellite Data Services Division

Figure 8.— A dramatic portrait of ex–Typhoon Flo was taken on the 22d at about 0130. The storm was causing problems over the northern shipping lanes and the Aleutians.

same day. Gene reached severe tropical storm strength in 2 days, while Odile attained hurricane intensity. On the 26th, Odile's winds hit 125 kn around a 935–mb pressure center. It maintained this strength for 24 hr, before it began to turn northwestward and weaken. Meanwhile, Gene became a typhoon some 210 mi south southwest of Okinawa, on the 26th, and crossed the Ryukyu Is the following day. By the 28th, Odile was over cool waters and dissipating as quickly as it intensified, while Gene, recurving northeastward, skirted the south coast of Kyushu on the 29th. On the last day of the month, Gene crossed the southern coast of Honshu and weakened near Tokyo.

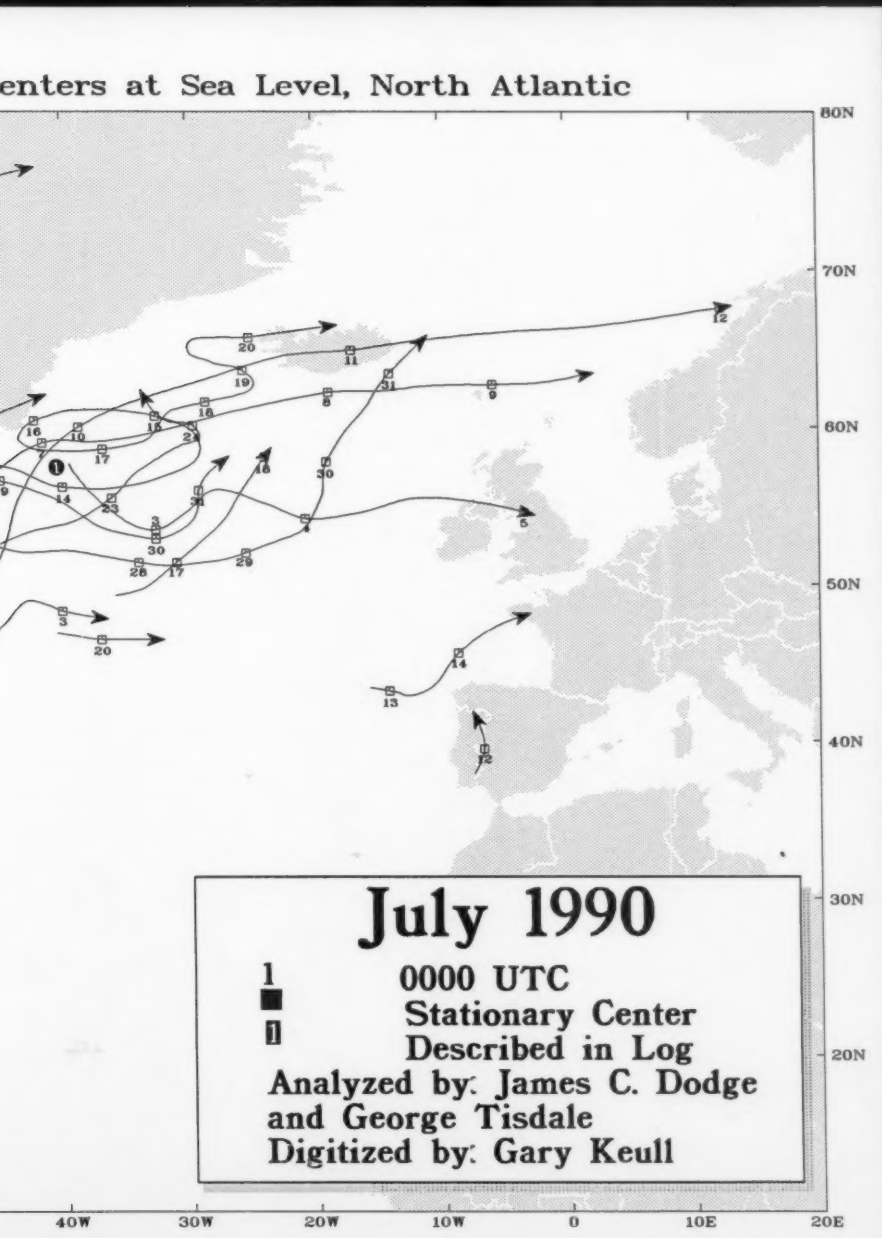
Hurricane Polo was in its formative stages by this time. Polo reached minimal hurricane intensity, but only briefly, near 15°N, 139°W, on the 30th. Around this time Tropical Storm Rachel was coming to life. By the 29th, it was at tropical storm strength about 575 mi southwest of Cabo San Lucas. It moved northward and then recurved northeastward. Rachel reached maximum intensity on October 2d, when winds hit 55 kn as the 994–mb center moved across the southern tip of Baja California. The center crossed the Gulf of California and made landfall on the west coast of Mexico.

Casualties

During Abe, one person was killed in Taiwan. On mainland China it was reported that 91 people lost their lives with another 40 reported missing. Zhejiang and Jiangsu provinces were hardest hit. Dot triggered landslides in the northern Philippines, resulting in four deaths, while seven people in Taiwan were killed with another four reported missing. On mainland China, where Dot made landfall, it was responsible for some 69 deaths. Cecil made landfall near Wenzhou, where 43 people lost their lives and 42 were missing. Ed was responsible for at least 10 deaths in Vietnam, while at least 167 ships and fishing vessels sank. Flo's torrential rains triggered floods and landslides in Japan, where 38 people were killed and 12 were reported missing. Japan also suffered four deaths during Gene.

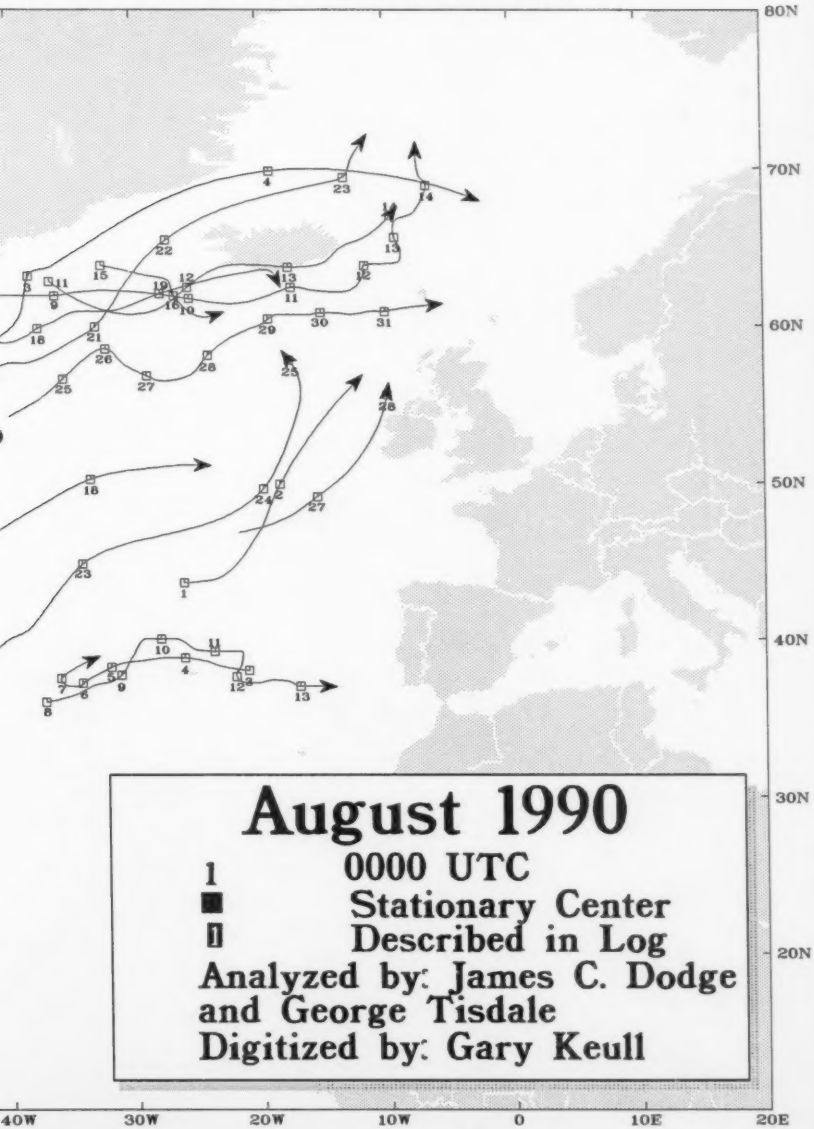
Torrential rains from a Low over South Korea on the 11th, resulted in floods and landslides that caused 93 deaths. These rains forced the River Han to its highest level since 1925. This river flows through Seoul and enters the Yellow Sea north of Inchon. More than 60,000 people were driven from their homes west of Seoul when a 300–ft section of the bank collapsed. In Inchon, a river vessel broke loose and hit a floating restaurant, cutting its anchor cable and causing it to drift downstream and hit a bridge. Police said 20 people were plucked to safety from the restaurant barge, but 10 others were missing. The bulk carrier/container vessel ***Singapore Victory*** sustained damage on the 19th and 20th in Typhoon Flo.

Principal Tracks of Cyclone Cent
90W
80W
70W
60W
50W


enters at Sea Level, North Atlantic
80N
70N
60N
50N
40N
30N
20N
40W
30W
20W
10W
0
10E
20E
July 1990
0000 UTC
Stationary Center
Described in Log
Analyzed by: James C. Dodge
and George Tisdale
Digitized by: Gary Keull

Principal Tracks of Cyclone Centers

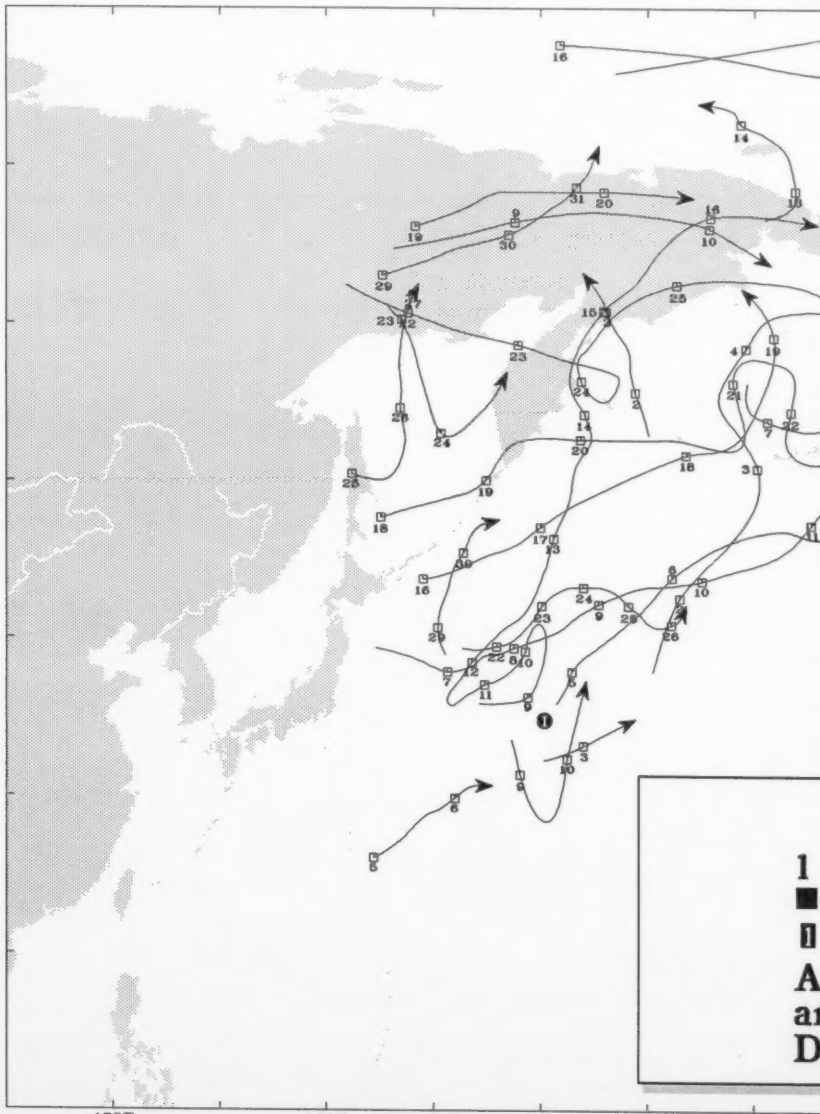
ers at Sea Level, North Atlantic



Principal Tracks of Cyclone Centers

ers at Sea Level, North Atlantic

Principal Tracks of Cyclone Centers



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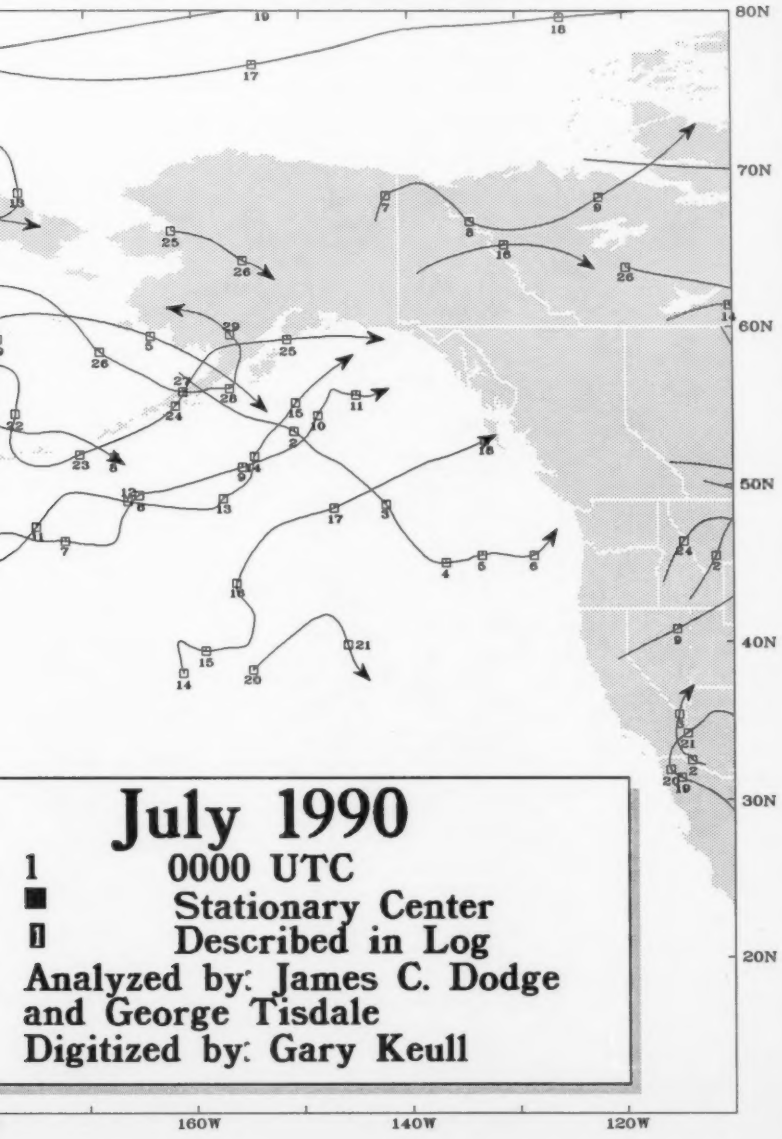
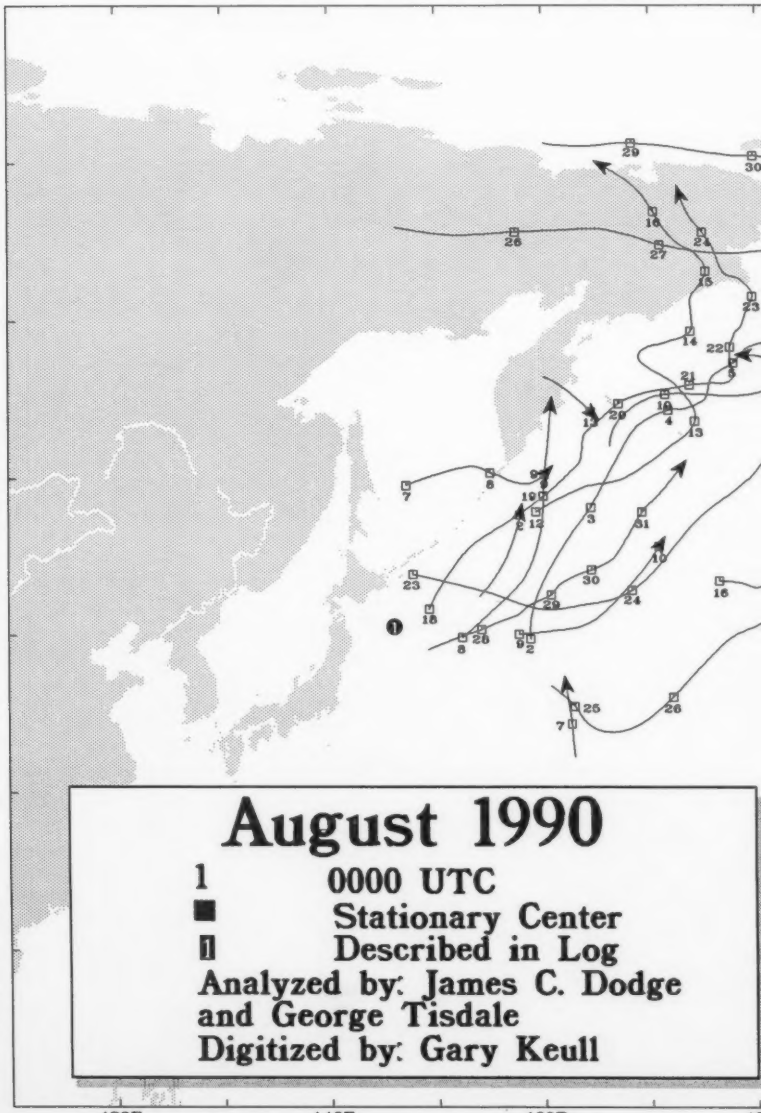
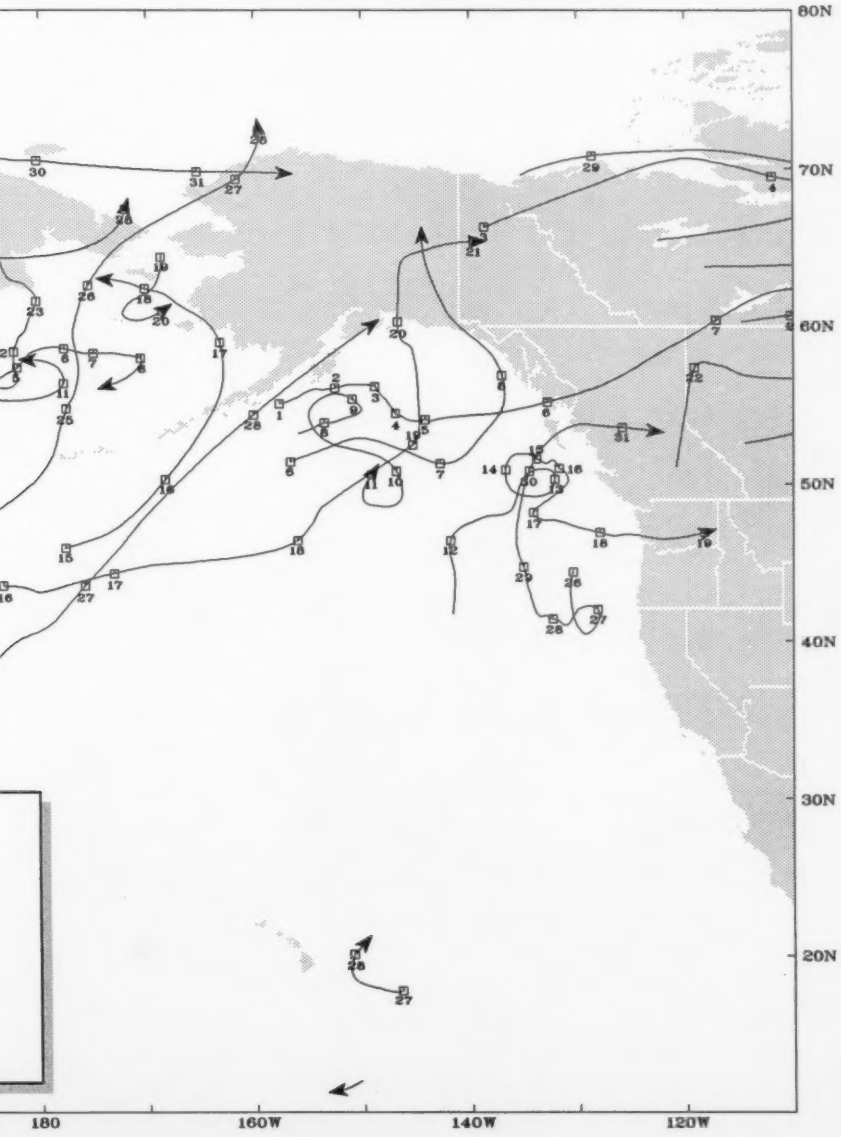


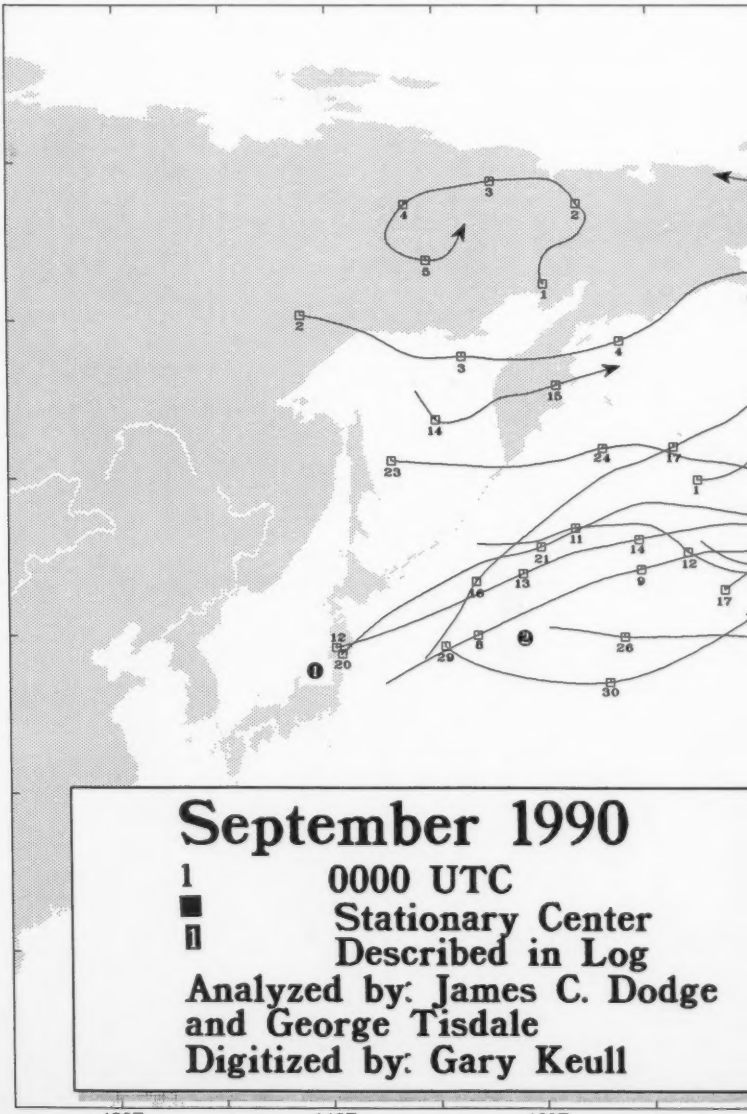
Principal Tracks of Cyclone Cent



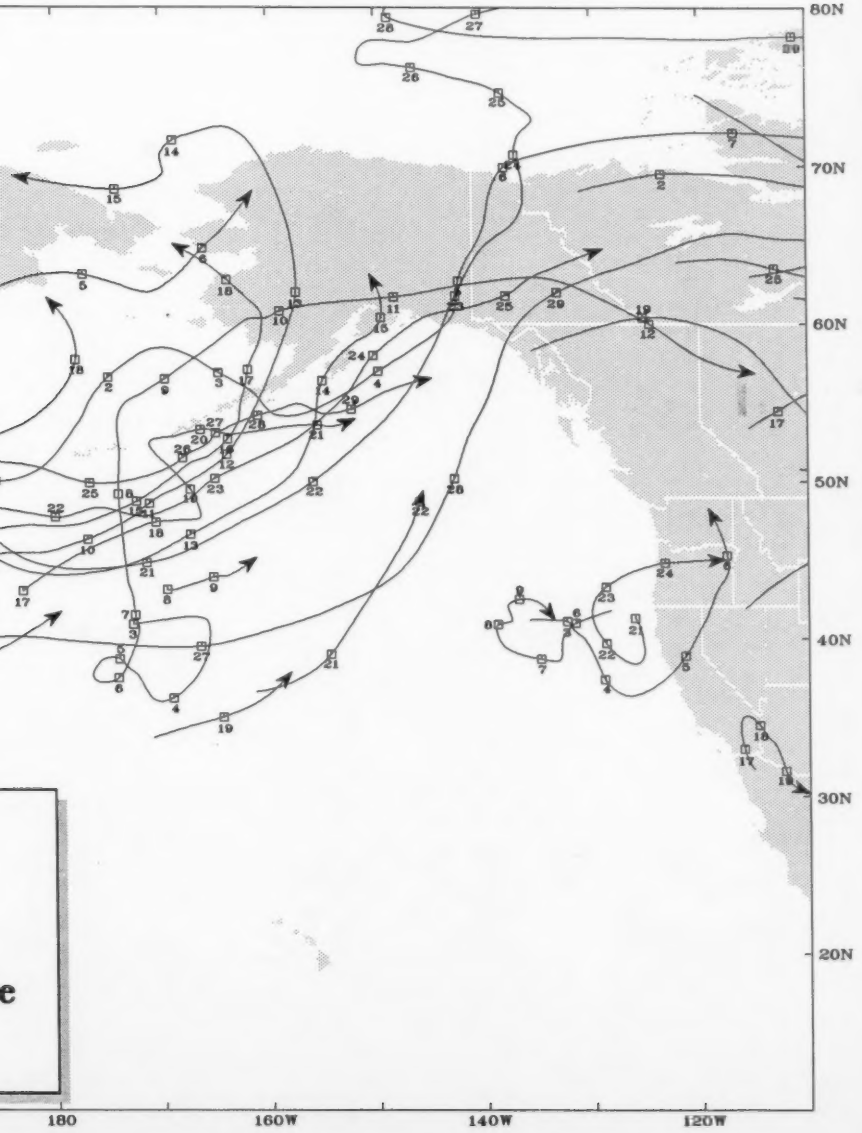
enters at Sea Level, North Pacific



Principal Tracks of Cyclone Cen

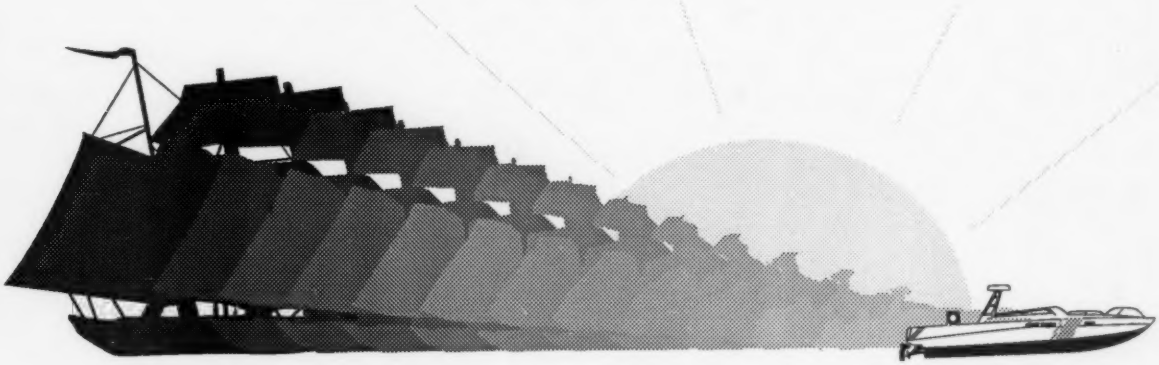


Centers at Sea Level, North Pacific



July, August, and September 1990

VESSEL	SHIP CALL	DATE	POSITION LAT. deg.	POSITION LONG. deg.	TIME GMT	WIND DIR. 10 deg.		WIND SPEED kn.	VSBY		PRES WX. code	PRESSURE mb.	TEMP deg C. Air	TEMP deg C. Sea	SEA WAVES PD. sec	SEA WAVES HGT. ft.	SWELL WAVES DIR	SWELL WAVES PD. sec	SWELL WAVES HGT. ft.
PACIFIC JULY	**NONE**																		
ATLANTIC JULY																			
STAR EAGLE	LAWO2	30	32.9 N	67.3 W	12	23		50	1	NM	16		26.5		10	18	25	10	19.5
NEDLLOYD HOLLAND	KRHX	30	34.2 N	64.4 W	18	18	M	41	2	NM	25		26.7	21.6	7	16.5	22	10	24.5
NEDLLOYD HOLLAND	KRHX	30	34.0 N	65.0 W	21	22	M	40	2	NM			25.6	21.4	7	19.5	22	10	24.5
STAR EAGLE	LAWO2	31	32.7 N	69.4 W	00	27		46	5	NM		1008.8	25.0		10	16.5	35	10	19.5
PACIFIC AUG.																			
BROOKLYN BRIDGE	ELFV8	5	32.0 N	144.2 E	00	20	M	42	2	NM	60	0995.7	26.5	26.0	10	24.5	24	15	29.5
LARS MAERSK	OXMD2	10	35.2 N	141.5 E	00	13		40	50	YD		1004.9			12	24.5			
PRESIDENT MONROE	WNRD	15	17.0 N	133.2 E	12	29	M	48	.5	NM	53		27.2	28.9	6	19.5	27	7	16.5
PRESIDENT MONROE	WNRD	15	17.0 N	132.0 E	15	28	M	44	.5	NM	53	0991.8	28.3	28.9	5	19.5	28	7	19.5
PRESIDENT MONROE	WNRD	15	17.0 N	129.7 E	21	28	M	44	1	NM	53	0991.2		28.9	5	19.5	28	7	19.5
PRESIDENT MADISON	WCIP	19	49.9 N	167.1 E	23	26	M	40	10	NM	02	0993.5	11.7	8.9	2	13	26	7	19.5
PRESIDENT MADISON	WCIP	20	48.5 N	163.5 E	12	27	M	40	10	NM	02	1000.5	11.7	8.9	4	13	28	7	19.5
PRESIDENT JACKSON	WRYC	30	24.9 N	129.0 E	00	16	M	42	5	NM	03	1003.1	28.0	26.7	5	16.5	22	8	29.5
PRESIDENT JACKSON	WRYC	30	23.2 N	125.9 E	12	19	M	50	5	NM	02	0998.1	28.5	26.8	8	16.5	18	14	24.5
PRESIDENT JACKSON	WRYC	30	22.6 N	123.8 E	18	21	M	50	5	NM	02	0996.0	27.5	27.1	8	14.5	19	9	28
PRESIDENT JACKSON	WRYC	31	22.2 N	121.6 E	00	25	M	59	5	NM	02	0996.5	29.0	27.2	6	14.5	22	7	28
ATLANTIC AUG.	**NONE**																		
PACIFIC SEP.																			
MAJESTIC MAERSK	OUJH2	10	41.4 N	176.2 E	00	31	M	43	5	NM		1008.6	16.6	17.1	4	19.5	30	6	10
SKAUBORD	LADC2	14	53.7 N	150.8 W	00	17	M	41	2	NM	63	0999.0	14.0	12.5	9	31	17	10	32.5
LIBREA	WDZG	16	23.7 N	137.8 E	00	14	M	41	5	NM	03	1006.0	27.0	27.0	3	10	14	9	32.5
SANSINENA II	WSIN	17	58.5 N	148.2 W	00	11	M	40	5	NM	02	1001.0	11.1	10.6	6	24.5	25	8	32.5
	WTSW	18	25.0 N	125.5 E	00	31		45				1003.5	24.4	25.6	7	23	33	7	23
	WTSW	18	25.3 N	126.6 E	06	33		45				1003.7	26.1	26.1	6	19.5	35	10	23
LNG TAURUS	WDZW	19	27.0 N	133.1 E	00	24	M	40	5	NM		1004.0	26.7	28.3	18	19.5	28	20	23
PRESIDENT MADISON	WCIP	19	53.7 N	149.7 W	06	18		40	5	NM	51	0996.0	12.8	12.2	XX	10	19	XX	19.5
PRESIDENT POLK	WRYD	19	30.2 N	140.2 E	12	19	M	40	> 25	NM		1008.6	27.6	29.3	7	19.5	27	8	21
PRESIDENT POLK	WRYD	19	30.2 N	139.3 E	18	23	M	48	10	NM		1006.2	27.8	28.9	9	29.5	20	8	23
PRESIDENT JACKSON	WRYC	23	51.8 N	151.8 W	18	23	M	54	5	NM		0990.5	11.1	11.2	5	11.5	21	12	19.5
SOLAR WING	ELJS7	25	42.5 N	132.4 W	18	34	M	45	10	NM		1015.0	15.5	18.0	6	23	33	8	23
	WTSW	27	50.0 N	165.3 W	18	29		40	10	NM	16	0986.0	7.8	9.4	8	24.5	28	10	16.5
ARCO CALIFORNIA	WMCV	28	52.4 N	135.4 W	18	24		42	10	NM		1009.0	12.2	12.2	7	19.5	25	12	10
KENAI	WSNB	28	54.6 N	137.8 W	18	26		49	5	NM	16		11.1	13.3			26	10	26
WESTWARD VENTURE	KHJB	28	54.2 N	135.7 W	21	20	M	50	.5	NM		1006.0	13.0	12.2	6	16.5	25	7	32.5
SUNBELT DIXIE	D5BU	30	41.6 N	178.2 W	18	04	M	43	1	NM	65	1001.1	12.4	14.6	7	19.5	XX	XX	23
ATLANTIC SEP.																			
RALEIGH BAY	KRHG	15	40.5 N	45.6 W	15	15	M	45	1	NM		0998.0	27.0	23.6	3	13	15	8	24.5
RALEIGH BAY	KRHG	15	40.7 N	46.3 W	18	15	M	42	1	NM	62	0993.0	24.0	23.0	5	13	15	15	29.5
AMERICAN EAGLE	WFPJ	26	38.3 N	29.6 W	18	01		40	5	NM		1006.5	21.7	20.0	2	8	36	6	21



200 Years of Service
1790 – 1990
U.S. Coast Guard

July, August, and September 1990

Ship Name	radio	mail
1ST LT ALEX BONNYMAN	34	42
1ST LT JACK LUMMIS	37	
2ND LT. JOHN P. BOBO	7	2
A. V. KASTNER	119	
ACADIA FOREST	84	40
ACE ACCORD	28	
ACONCAGUA		41
ACT 11	15	
ACT 111	184	
ACT 12	86	
ACT 5	172	
ACT 6	156	
ACT 7	204	
ACT I	47	
ACT IV	183	
ADABELLE LYKES	100	162
ADDIRIYAH	67	36
ADMIRALTY BAY	7	
AEL AMERICA	7	
AEL EUROPA	68	
AINO	17	60
ALASKA MARU	21	
ALASKA RAINBOW	19	44
ALBERT MAERSK	10	40
ALDEN W. CLAUSEN	22	80
ALEMANIA EXPRESS	63	
ALLIGATOR FORTUNE	6	
ALLIGATOR GLORY	24	16
ALLIGATOR HOPE	54	
ALLIGATOR JOY	7	24
ALLIGATOR LIBERTY	55	
ALLIGATOR PRIDE	5	102
ALMERIA LYKES	50	34
ALPHA HELIX	134	152
ALTAMONTE	35	15
AMBASSADOR		38
AMBASSADOR BRIDGE	52	39
AMERICA EXPRESS	62	
AMERICA MARU	238	
AMERICAN CONDOR	44	70
AMERICAN CORMORANT	39	51
AMERICAN EAGLE	69	31
AMERICAN FALCON	7	19
AMERICAN REPUBLIC	55	
AMERICAN TRADER	40	113
AMERICANA	42	54
AMERIGO VESPUCCI	10	19
AMOCO CREMONA	1	
ANDERS MAERSK	79	132
ANTHONY RAINBOW	19	78
AQUA CITY	18	
ARCO ALASKA	23	107
ARCO ANCHORAGE	21	33
ARCO CALIFORNIA	8	28
ARCO FAIRBANKS	18	
ARCO INDEPENDENCE	21	41
ARCO JUNEAU	31	
ARCO PRUDHOE BAY	26	13
ARCO SAG RIVER	8	11
ARCO SPIRIT	10	6
ARCO TEXAS	19	51
ARCTIC DISCOVERER	143	322
ARCTIC OCEAN	3	13
ARCTIC TOKYO	53	114
ARGONAUT	47	135
ARIES	3	
ARMCO	103	
ARNOLD MAERSK	48	39
AROSIA	100	42
ARTHUR M. ANDERSON	149	170
ARTHUR MAERSK	4	31
ASHLEY LYKES	57	39
ASPEN	17	90
ASTORIA	114	
ASTRO JYOJIN		76
ASTRO VENUS	49	135
ATIGUN PASS	103	184
ATLANTIC	56	
ATLANTIC CARTIER	114	
ATLANTIC CONVEYOR	129	
ATLANTIC OCEAN	101	81
ATLANTIS II	52	
AURORA ACE	25	
AUSTRAL RAINBOW	37	102
AXEL MAERSK	53	109
B.T. SAN DIEGO	53	194
BADGER	184	279
BAJKA	10	24
BALTIMORE TRADER	36	39
BARDU	18	
BARRYDALE	176	
BAY BRIDGE	141	117
BCR KING	256	
BEBECOURO	90	104
BEER SHEVA	3	
BELGIAN SENATOR	35	
BENJAMIN HARRKON	6	20
BIBI	138	
BISLIG BAY	13	30
BLUE HAWK	63	
BOGASARI DUA	9	
BOGASARI EMPAT	41	120
BOGASARI LIMA	61	69
BOHOL SAMPAGUITA	59	104
BONN EXPRESS	102	
BOW CHASER	17	
BOW SELENE	2	
BRIGIT MAERSK	67	123
BRILLIANCY		125
BRILLIANT ACE	122	
BROOKLYN BRIDGE	47	49
BROOKS RANGE	35	
BUM DONG	19	
BUNGA KANTAN	66	
BUNGA KENANGA	18	
BUNGA KESIDANG	4	
BURNS HARBOR	113	
CALCITE II	89	104
CAPE HENRY	21	
CAPE HORN	16	
CAPE HUDSON	25	50
CAPRICORN	37	17
CARIBAN	86	56
CARIBE 1	3	49
CARLA A. HILLS		130
CARLIVALE	45	55
CARMAN	1	
CARMEL	22	110
CAROLINA	24	149
CARTAGENA	73	63
CASON J. CALLAWAY	164	180
CATTLEYA ACE		70
CELEBRATION	53	17
CENTURY HIGHWAY #2	243	106
CENTURY HIGHWAY NO. 5	212	114
CGM CHAMPAGNE	1	53
CGM LORRAINE	27	
CGM PROVENCE	89	
CHABLIS	37	
CHALLENGER	54	
CHARLES E. WILSON	114	
CHARLES PIGOTT		60
CHARLOTTE LYKES	99	150
CHELSEA	24	31
CHEMICAL PIONEER	68	90
CHERRY VALLEY	29	11
CHESAPEAKE TRADER	62	174
CHESNUT HILL	10	
CHEVRON ANTWERP	18	
CHEVRON BURNABY	68	
CHEVRON CALIFORNIA	136	89
CHEVRON COLORADO	14	25
CHEVRON COPENHAGEN		73
CHEVRON EDINBURGH	11	7
CHEVRON FELUY		93
CHEVRON LONDON	22	229
CHEVRON LOUISIANA	39	91
CHEVRON METEOR	23	79
CHEVRON MISSISSIPPI	51	79
CHEVRON OREGON	13	30
CHEVRON PACIFIC	10	242
CHEVRON SKY		238
CHEVRON STAR		100
CHEVRON SUN		149
CHEVRON WASHINGTON	3	22
CITADEL HILL	134	131
CLARENCE	136	
CLEMENT	78	
CLEMENTINA	34	
CLEVELAND	41	42
COAST RANGE	16	41
COASTAL CORPUS CHRISTI	21	23
COLIMA	24	100
COLUMBIA STAR	24	
COLUMBUS AMERICA	41	
COLUMBUS AUSTRALIA	126	
COLUMBUS CANADA	211	
COLUMBUS LOUISANA	62	
COLUMBUS NEW ZEALAND	171	
COLUMBUS OHIO	144	283
COLUMBUS OLIVOS	63	80
COLUMBUS ONTARIO	69	42
COLUMBUS OREGON	89	
COLUMBUS QUEENSLAND	70	
COLUMBUS VICTORIA	207	
COLUMBUS VIRGINIA	110	
COLUMBUS WELLINGTON	132	
COMPANION EXPRESS	50	
CONCERT EXPRESS	66	
CONSENSUS SEA	9	
CONTIENTAL WING	103	24
CONTINENTAL HIGHWAY	23	
CONTSHIP AUSTRALIA	13	
CONTSHIPSPAIN	45	149
CORAH ANN	33	
CORMORANT ARROW	41	59
CORNUCOPIA	49	95
CORONADO	46	17
CORWITH CRAMER	6	
COURTNEY BURTON	146	
CPL. LOUIS J. HAUGE JR	3	
CRISPEN OGLEBAY	18	
CRISTOFORO COLOMBO	16	28
CSS HUDSON	181	
CYPRESS PASS	10	10
D.L.BOWER		95
DAVID PACKARD		154
DELAWARE BAY	4	
DELAWARE TRADER	40	74
DIANA		15
DILIGENCE TRADER	43	19
DIRECT EAGLE	12	
DOLE ECUADOR	10	186
DON JORGE	5	
DONAIRE		273
DUSSELDORF EXPRESS	81	
EASTERN GLORY	35	162
EASTERN VENTURE	45	93
EDEN	27	24
EDGAR B. SPEER	300	337
EDWARD L. RYERSON	1	143
EDWIN H. GOTT	243	278
ELIZABETH LYKES	15	
EMERALD SEA	169	161
ENDEAVOR	38	11
ENSOR	92	136
ESPERANZA	14	
ESSO PUERTO RICO	37	209
ETERNITY	102	77
EVER GAINING	3	5
EVER GALLANT	18	8
EVER GENTLE	33	9
EVER GENTRY	2	
EVER GIANT	1	43
EVER GIFTED	12	
EVER GIVEN	10	
EVER GLEAMY	7	
EVER GLOBE	2	23
EVER GLOWING	9	
EVER GOING	3	27
EVER GOVERN	4	
EVER GRACE	7	34
EVER GROUP	5	5
EVER GROWTH	1	7
EVER GUIDE	14	
EVER LEVEL	6	11
EVER LINKING	9	6
EVER LOADING	1	12
EVER LYRIC	6	12
EXPORT FREEDOM	30	82
EXPORT PATRIOT	39	100
EXXON BATON ROUGE	18	23
EXXON BENICIA	2	
EXXON BINICA		2
EXXON LONG BEACH	11	8
EXXON NEW ORLEANS	6	7
EXXON NORTH SLOPE		5
EXXON PHILADELPHIA	22	
EXXON VALDEZ	14	24
FALSTRIA	61	64
FARNELLA	120	109

Ship Name	radio	mail
FAUST	53	51
FERNCROFT	159	216
FESTIVALE	4	90
FETISH	134	136
FLICKERTALE STATE	10	24
FLORIDA RAINBOW	72	191
FORTALEZA	122	214
FRANCES HAMMER	67	93
FRANCIS SINCERE NO. 6	44	
FRED R. WHITE JR	26	
FREDERICKSBURG	38	23
FROTASIRIUS	13	
FUJI	41	85
GALVESTON BAY	57	141
GATEWAY EAST	62	113
GEMINI	25	51
GENERAL HIZON	20	
GENEVIEVE LYKES	54	
GEORGE A. SLOAN	176	199
GEORGE A. STINSON	42	
GEORGE WASHINGTON BRID	187	
GEORGIA		73
GERMAN SENATOR	81	
GERONIMO	13	10
GLACIER BAY	33	120
GLOBAL FAME	18	
GLORIOUS SPICA	60	
GLORY STAR	8	35
GOLDEN ENDEAVOR	27	71
GOLDEN GATE	12	17
GOLDEN GATE BRIDGE	182	35
GOLDEN MONARCH	2	
GOLDEN TOPAZ	13	8
GOLDEN TRADER	2	
GRAIGLAS	152	
GREAT LAND	32	29
GREAT RIVER	22	87
GREEN BAY	106	253
GREEN ENGELES	6	9
GREEN HARBOUR	25	
GREEN ISLAND	1	
GREEN KOBE	64	80
GREEN LAKE	83	52
GREEN MASTER	37	37
GREEN MAYA	31	22
GREEN RAINIER	39	50
GREEN RIDGE	90	114
GREEN SAIKAI	3	36
GREEN SASEBO	53	88
GREEN SUMMA		49
GREEN VALLEY	35	23
GREEN WAVE	15	11
GUANAJUATO	125	137
GUAYAMA	57	69
GULF SENTRY	24	142
GULF SPIRIT	42	
GYPSUM BARON	170	
GYPSUM KING	196	
GYRE	5	
HAKONE MARU	116	
HANEI SKY	58	162
HANEI SUN	22	
HANJIN BUSAN	15	42
HANJIN CHEJU	33	33
HANJIN CHUNGMU	14	18
HANJIN HONG KONG	15	
HANJIN KEELUNG	18	28
HANJIN KOBE	12	
HANJIN KUNSAN	32	
HANJIN LONG BEACH	47	12
HANJIN MASAN	11	15
HANJIN NEW YORK	21	
HANJIN POHANG	23	
HANJIN SAVANNAH	30	18
HANJIN SEATTLE	15	14
HANJIN SEOUL	25	
HANJIN TONGNAE	41	42
HANJIN YOKOHAMA	16	23
HANJIN YOSU	27	18
HANSA CARRIER	97	
HARMAC DAWN	39	
HAWAIIAN RAINBOW	46	45
HEIDELBERG EXPRESS	107	
HENRY HUDSON BRIDGE	198	
HERBERT C. JACKSON	20	
HERMENIA	27	16
HESIOD	85	
HIRA #2	68	
HOEGH CAIRN	17	25
HOEGH CLIPPER	5	
HOEGH DENE	7	
HOEGH DRAKE	4	
HOEGH DUKE	24	
HOEGH DYKE	13	

Ship Name	radio	mail
HOEGH MIRANDA		38
HOLIDAY	14	
HOLLANDIC	22	60
HOLSTEN CARRIER	117	
HONOLULU	144	
HOWELL LYKES	40	107
HUAL ANGELITA	29	104
HUMACAO	4	9
HUMBER ARM	17	8
HYUNDAI #101	39	
HYUNDAI #201	8	
HYUNDAI #203	15	
HYUNDAI CHALLENGER	8	
HYUNDAI COMMANDER	14	13
HYUNDAI CONTINENTAL	45	
HYUNDAI ISLAND	30	
HYUNDAI NO 102	41	
HYUNDAI NO. 109	8	
HYUNDAI NO.1	109	116
HYUNDAI PIONEER	22	
HYUNDIA EXPLORER	32	
IBIS ARROW	22	
INCOTRANS PACIFIC	15	
INDIAN OCEAN	30	100
INFANTA	158	
INGER	64	144
IRMA M	119	
IRVING L. CLYMER	82	97
ISLAND PRINCESS	43	
IST LT BALDOMERO LOPEZ	4	46
ITAITE	60	
ITAPE	41	
ITB CHARLESTON	25	58
ITB PHILADELPHIA	136	151
J. BURTON AYERS	123	
J.L. MAUTHE	39	
JADRAN EXPRESS	15	
JALISCO	80	26
JAPAN ALLIANCE	136	105
JAPAN APOLLO	92	63
JEAN LYKES	36	18
JO BIRK	35	
JO CLIPPER	79	
JO CYPRESS	117	
JO LONN	112	
JO OAK	52	
JOHANNA OLDENDORFF	2	
JOHN A. MCCONE		95
JOHN G. MUNSON	200	222
JOHN LYKES	29	
JOHN YOUNG	2	86
JOSEPH H. FRANTZ	32	
JOSEPH LYKES	25	
JOVIAN LILY	4	172
JOVIAN LUZON	100	95
JUBILEE	2	
JULIUS HAMMER	61	63
K. TOPIC	29	
KAIMOKU	63	210
KAINULA	48	175
KALIDAS	3	
KAUAI	55	141
KAYE E. BARKER	360	
KEE LUNG	6	121
KEISHO MARU	45	
KENAI	49	169
KENNETH E. HILL	37	181
KENNETH T. DERR	25	117
KENTUCKY HIGHWAY	11	
KEYSTONE CANYON	14	14
KEYSTONER	55	129
KISO	111	
KITTANNING	28	52
KOFUKU MARU	1	
KOKUA	44	
KOLN EXPRESS	141	
KOPER EXPRESS	6	
KOYAGI SPIRIT	36	
KUROBE	75	
LAKE ERIE	76	50
LARS MAERSK	40	71
LASH ATLANTICO	11	
LAURA MAERSK	39	116
LAWRENCE H. GIANELLA	68	24
LEDA MAERSK	34	51
LESLIE LYKES	52	41
LETITIA LYKES	48	125
LEWIS WILSON FOY	315	
LIBERTY STAR	11	18
LIBERTY SUN	77	92
LIBERTY WAVE	56	138
LIBREA	24	42
LILAS	17	180
LIRCAY	76	

Ship Name	radio	mail
LLOYD SAO PAULO	56	
LNG AQUARIUS	31	43
LNG LEO	51	57
LNG TAURUS	3	97
LNG VIRGO	37	17
LOTUS ACE	87	
LOUIS MAERSK	32	102
LOUISE LYKES	21	
LOUISIANA	10	264
LOUISIANA BRIMSTONE	77	98
LT. ODYSSEY	92	
LUHLINE	73	183
LYRA	60	64
M. F. GRACE	24	
MAASSLOT	119	
MACKINAC BRIDGE	179	65
MAERSK COMMANDER	143	
MAERSK CONSTELLATION	123	207
MAERSK FINE	141	97
MAERSK SUN	59	42
MAERSK TITAN	1	
MAERSK WIND	54	78
MAGALLANES	11	38
MAGIC	86	63
MAJESTIC MAERSK	13	83
MALINI	11	
MALLORY LYKES	84	99
MANGAL DESAI	12	
MANHATTAN BRIDGE	124	24
MANUKAI	39	181
MANULANI	55	168
MAR TRANSPORTER II	21	
MARATHA MAJESTY	8	
MARCHEN MAERSK	34	115
MAREN MAERSK	36	90
MARGARET LYKES	32	109
MARGRETHE MAERSK	35	69
MARIA		54
MARIA TOPIC	1	24
MARIE MAERSK	6	27
MARIF	27	14
MARINE RELIANCE	12	27
MARIT MAERSK	41	125
MARITIME ASSOCIATE	17	
MARJORIE LYKES	32	
MARLIN		213
MATHILDE MAERSK	51	135
MATSONIA	78	169
MAUI	51	193
MAURIC EWING	71	97
MAYAGUEZ	25	37
MC KINNEY MAERSK	61	105
MEDALLION	85	42
MEDUSA CHALLENGER	64	
MELANIE	2	
MERCANDIAN CONTINENT	29	
MERCANDIAN SUN II	82	112
MERCURY ACE	44	
MERIDA	51	10
MERKUR DELTA	68	25
MESABI MINER	40	
METTE MAERSK	54	79
MICHIGAN HIGHWAY	11	
MICRONESIAN COMMERCE	12	
MICRONESIAN INDEPENDEN	22	
MIDDLETOWN	44	1
MINDORO SAMPAGUITA	16	31
MINERVA	11	
MING COMFORT	28	26
MING MOON	8	23
MING OCEAN	6	
MING PLENTY	7	22
MING PROMOTION	6	63
MING PROSPERITY	19	
MING SPRING	6	
MING UNIVERSE		7
MITLA	50	
MOANA PACIFIC	125	
MOBIL ARCTIC	16	40
MOBIL MERIDIAN	124	148
MOKU PAHU	130	156
MONTRACHET	29	8
MORELOS	53	61
MORMACSKY	53	5
MORMACSTAR	35	25
MORMACSUN	67	43
MSC CHIARA	21	59
MSC SABRINA	37	
MYRON C. TAYLOR	9	
NACIONAL SANTOS	13	
NAMSAN SPIRIT	9	
NANCY LYKES	16	
NARA	55	132
NATIONAL DIGNITY	33	109

Ship Name	radio	mail
NATIONAL HONOR	32	164
NATIONAL PRIDE	21	34
NAVIOS UNIQUE	44	
NECHES	22	
NEDLLOYD BAHRAIN	106	
NEDLLOYD BALTIMORE	126	
NEDLLOYD BANGKOK	51	
NEDLLOYD BARCELONA	113	
NEDLLOYD HOLLAND	45	152
NEDLLOYD HUDSON	67	145
NEDLLOYD KATWIJK	2	
NEDLLOYD KEMBLA	32	
NEDLLOYD KINGSTON	116	
NEDLLOYD KYOTO	132	
NEDLLOYD MANILA	178	
NEDLLOYD ROCHESTER	145	
NEDLLOYD ROTTERDAM	124	
NEDLLOYD ROUEN	80	
NEDLLOYD VAN CLOON	58	
NEPTUNE ACE	87	
NEPTUNE AMBER	95	253
NEPTUNE CORAL	48	
NEPTUNE CRYSTAL	56	70
NEPTUNE DIAMOND	170	
NEPTUNE GARNET	46	
NEPTUNE JADE	31	
NEPTUNE PEARL	70	125
NEW HORIZON	112	177
NEWARK BAY	47	84
NIGASAKI SPIRIT	35	69
NIPPON HIGHWAY	23	30
NOAA DAVID STARR JORDA	137	203
NOAA SHIP CHAPMAN	310	279
NOAA SHIP DAVIDSON	161	
NOAA SHIP DELAWARE II	236	151
NOAA SHIP DISCOVERER O	473	372
NOAA SHIP FERREL	116	76
NOAA SHIP HECK 591	2	4
NOAA SHIP M. BALDRIDGE	396	439
NOAA SHIP MCARTHUR	371	
NOAA SHIP MILLER FREEM	153	96
NOAA SHIP MT MITCHEL	286	376
NOAA SHIP OREGON II	326	516
NOAA SHIP RAINIER	186	144
NOAA SHIP RUDE 590	1	19
NOAA SHIP SURVEYOR	190	146
NOAA SHIP T. CROMWELL	302	480
NOAA SHIP WHITING	388	428
NOBEL STAR	27	
NOMADIC LADY		42
NOSAC EXPLORER	21	31
NOSAC EXPRESS	36	88
NOSAC RANGER	74	94
NOSAC SKY	18	42
NOSAC TAKARA	18	
NOSAC TAKAYAMA	48	
NOVA EUROPA	95	76
NUEVO SAN JUAN	54	105
NURNBERG EXPRESS	87	
OAXACA	72	
OCEAN ASPIRATION	56	91
OCEAN BRIDGE	35	26
OCEAN HIGHWAY	74	38
OCEAN LILY	23	12
OCEAN LUCKY	24	53
OCEAN MASTER	24	
OCEAN SEL	10	7
OGDEN WABASH	24	
OLEANDER	93	133
OLGA TOPIC	20	72
OMI MISSOURI	54	151
OOCL DOMINANCE	18	
OOCL EDUCATOR	54	
OOCL EXECUTIVE	82	66
OOCL FAIR	54	36
OOCL FAITH	16	6
OOCL FORTUNE	29	
OOCL FRIENDSHIP	51	27
ORANGE BLOSSOM	23	102
ORANGE STAR	75	48
ORCHID	39	130
ORCHID #2	36	24
OREGON RAINBOW II	38	78
ORIENTAL DIPLOMAT	1	
ORIENTAL EXPLORER	60	37
ORIENTAL FERM	43	
ORIENTAL FREEDOM	93	
ORIENTAL KNIGHT	2	
ORIENTAL PATRIOT	52	56
ORION HIGHWAY	60	93
OSPREY ARROW	82	
OVERSEAS ALICE	4	
OVERSEAS BOSTON	1	100
OVERSEAS HARRIET	51	134
OVERSEAS JOYCE	76	200
OVERSEAS JUNEAU		1
OVERSEAS MARILYN	20	8
OVERSEAS NEW ORLEANS	29	40
OVERSEAS VALDEZ	64	28
OVERSEAS VIVIAN	72	51
PACBARON	15	
PACDUCHESS	57	
PACDUKE	31	
PACGLORY	26	
PACIFIC ARROW	73	82
PACIFIC EMERALD	28	41
PACIFIC PRINCESS	24	
PACIFIC SENTRY	12	
PACKING	102	57
PACMERCHANT	34	
PACNOBLE	36	3
PACOCEAN	26	
PACPRINCE	9	
PACPRINCESS	42	
PACSEA	27	
PACSTAR	32	
PACSUN	6	7
PAGA	43	134
PAPYRUS	15	137
PATRIOT	88	
PAUL BUCK	40	22
PECOS	27	40
PEGGY DOW	150	
PELANDER	60	68
PENNSYLVANIA TRADER	38	
PERMEKE	73	
PERSEVERANCE	74	7
PETER W. ANDERSON	116	144
PFC DEWAYNE T. WILLIAM	19	
PFC JAMES ANDERSON JR	64	45
PFC WILLIAM B. BAUGH	96	87
PHAROS	65	
PHILIP R. CLARKE	112	134
PHILLIPS VENEZUELA		80
PINE FOREST	18	140
POCANTICO	4	
POLAR ALASKA	3	171
POLYNESIA	249	290
POMEROL	5	41
PONCE	16	27
POQUITA MAMI	23	50
POTOMAC TRADER	27	
PRESIDENT ADAMS	103	196
PRESIDENT ARTHUR	49	200
PRESIDENT BUCHANAN	8	
PRESIDENT EISENHOWER	155	147
PRESIDENT F. ROOSEVELT	42	156
PRESIDENT GARFIELD	16	
PRESIDENT GRANT	67	88
PRESIDENT HARDING	26	
PRESIDENT HARRISON	160	
PRESIDENT HOOVER	83	49
PRESIDENT JACKSON	140	163
PRESIDENT JEFFERSON	39	90
PRESIDENT KENNEDY	98	171
PRESIDENT LINCOLN	167	170
PRESIDENT MADISON	67	167
PRESIDENT MONROE	130	196
PRESIDENT POLK	126	171
PRESIDENT TRUMAN	86	132
PRESIDENT TYLER	48	141
PRESIDENT WASHINGTON	145	107
PRESQUE ISLE	134	
PRIMORJE	26	
PRINCE OF TOKYO	56	91
PRINCE OF TOKYO 2	80	167
PRINCE WILLIAM SOUND	7	24
PRINCESS DIAN	1	22
PROSPERO	9	
PUERTO CORTES	68	69
PUNTA BRAVA	16	16
PURITAN	52	
PVT HARRY FISHER	60	
QUALITY OF LIFE	60	
QUEEN ELIZABETH 2	133	
RAINBOW BRIDGE	47	35
RAINBOW HOPE	166	59
RALEIGH BAY	52	151
RANGER	50	
REFORM	40	63
RESERVE	61	
RESOLUTE	30	82
RICHARD G MATTIESEN	37	
RICHARD REISS	2	
RIJEKA EXPRESS	4	
RIMBAS KEMPAS	20	30
RIO FRIO	101	
RIO NEGRO II	24	
RISING STAR	12	45
RIVER ETERNITY	2	
ROBERT E. LEE	16	22
ROGER BLOUGH	85	136
ROGER R. SIMONS	50	63
ROSETTA	104	70
ROSINA TOPIC	8	
ROVER	96	118
ROYAL PRINCESS	98	
RUBIN OCEAN	8	40
RUTH LYKES	31	
S.T. CRAPO	97	1
SALINAS	38	153
SAM HOUSTON	23	29
SAMU	59	97
SAMUEL L. COBB	63	75
SAN LUIS	38	
SAN MARTIN	59	
SAN MATEO VICTORY	39	137
SAN MIGUEL BAY	17	
SANKO HAWK	3	
SANKO PRELUDE	54	67
SANKO STORK	63	54
SANSINENA II	44	65
SANTA ADELA	30	58
SANTA JUANA	58	145
SANTA MARTA	32	
SANTA VICTORIA	16	21
SATURN DIAMOND	53	75
SAUDI ABHA	4	
SAUDI DIRIYAH	12	
SAUDI RIYADH	7	
SAVANNAH	70	
SAVANNAH MARU	1	
SCARAB	58	36
SEA BELLS	27	39
SEA COMMERCE	43	
SEA FAN	39	88
SEA FORTUNE	21	152
SEA FOX	36	24
SEA LANTERN		214
SEA LIGHT	24	45
SEA LION	305	407
SEA MERCHANT	307	426
SEA TRADE	111	
SEA WOLF	358	233
SEA-LAND ACHIEVER	289	
SEA-LAND INTEGRITY	67	122
SEA-LAND VALUE	67	175
SEALAND ANCHORAGE	33	36
SEALAND ATLANTIC	55	101
SEALAND CHALLENGER	26	50
SEALAND COMMITMENT	76	92
SEALAND CONSUMER	74	112
SEALAND CRUSADER	55	61
SEALAND DEFENDER	88	39
SEALAND DEVELOPER	47	94
SEALAND DISCOVERY	43	119
SEALAND ENDURANCE	31	27
SEALAND ENTERPRISE	255	274
SEALAND EXPEDITION	1	28
SEALAND EXPLORER	76	117
SEALAND EXPRESS	108	209
SEALAND FREEDOM	77	60
SEALAND INDEPENDENCE	44	83
SEALAND INNOVATOR	66	
SEALAND KODIAK	20	25
SEALAND LIBERATOR	85	63
SEALAND MARINER	66	86
SEALAND NAVIGATOR	224	266
SEALAND PACER	4	
SEALAND PACIFIC	195	235
SEALAND PATRIOT	52	26
SEALAND PERFORMANCE	76	102
SEALAND PRODUCER	26	179
SEALAND QUALITY	86	158
SEALAND TACOMA	24	70
SEALAND TRADER	142	93
SEALAND VOYAGER	104	76
SEAWARD BAY	30	26
SEDCO/BP 471	87	135
SENATOR	52	69
SGT WILLIAM A BUTTON	25	
SGT. METEJ KOCAK	9	
SHELDON LYKES	68	166
SHELLY BAY	48	121
SHENAHON	20	14
SHIN BEISHU MARU	89	
SHINKASHU MARU	74	
SHIRAOI MARU	135	41
SILVER CLIPPER	44	28
SITHEA	10	2
SKANDERBORG	66	50
SKAUBORD	50	113

Ship Name	radio	mail
SKEENA	117	
SKODBORG	16	37
SOARER CUPID	18	48
SOLAR WING	67	181
SONORA	71	122
SOPHIA	17	
SOUTHLAND STAR	68	
SPIRIT OF TEXAS	28	24
SPRING BEAR	207	
SPRING BEE	33	95
STAR CANADIAN	44	124
STAR EAGLE	63	156
STAR EVVIVA	15	
STAR FLORIDA	52	
STAR FRASER	108	
STAR FUJI	6	
STAR GEIRANGER	12	15
STAR GRAN	73	204
STAR GRIMDANGER	14	9
STAR HONG KONG	62	
STAR MERCHANT		43
STAR MERIT	13	7
STAR MINERVA	33	
STAR RANGER	27	
STELLA LYKES	22	42
STEWART J. CORT	102	150
STONEWALL JACKSON	24	30
STRATHCONON	17	
STRIDER ISIS	157	19
STUTTGART EXPRESS	64	
SUE LYKES	13	
SUGAR ISLANDER	40	
SUNBELT DIXIE	160	201
SUNWARD II	3	
SUSAK	3	
SWAN LAKE	121	173
SWIFTNES	27	
T.S.EMPIRE STATE	23	
TABASCO	69	25
TAI CHUNG	17	28
TAI CORN	1	
TALISMAN	14	
TAMPA	22	
TAMPA BAY	42	
TAYABAS BAY	44	142
TEMSE	44	
TEXACO GEORGIA	12	21
TEXACO NEW YORK	18	
TEXACO VERAGUAS	117	
TEXACO WESTCHESTER	64	
TEXACO WISCONSIN	1	
TEXAS CITY SEA	64	120
THOMAS WASHINGTON	135	190
THOMPSON LYKES	22	
THOMPSON PASS		50
TIA SHENG	8	24
TICAO SAMPAGUITA		31
TOBA	16	
TORZAN	19	28
TOLUCA	96	40
TONCI TOPIC	18	
TONSINA	61	163
TORRENS	25	40
TRANSWORLD BRIDGE	25	23
TRIGGER	34	49
TRITON	167	277
TROPIC SUN	5	7
TROPICAL BEAUTY		86
TROPICALE	34	53
TULSIDAS	4	
TUMILCO	166	83
TUVA	1	
TYSON LYKES	3	80
ULTRAMAR	29	
ULTRASEA	16	41
UNAMONTE	9	
UNIVERSE	37	
URTE	168	189
USCGC ACACIA (WLB406)	8	19
USCGC ACTIVE WMEC 618	43	4
USCGC ACUSHNET WMEC 16	11	
USCGC ALERT (WMEC 630)	33	
USCGC BASSWOOD (WLB 38	12	8
USCGC BISCAYNE BAY	8	57
USCGC BRAMBLE (WLB 392	32	
USCGC BUTTONWOOD WLB 3	9	
USCGC CAPE MORGAN	1	
USCGC CHEROKEE WMEC 16	15	
USCGC CHILULA (WMEC 15	64	
USCGC CITRUS (WMEC 300	126	
USCGC CONFIDENCE WMEC6	5	
USCGC DALLAS (WHEC 716	16	
USCGC DAUNTLESS WMEC 6		76
USCGC DURABLE (WMEC 62	15	
USCGC EAGLE (WIX 327)	55	
USCGC ESCANABA	5	
USCGC FIREBUSH WLB 393	18	
USCGC FORWARD	10	153
USCGC HAMILTON WHEC 71	5	
USCGC IRONWOOD (WLB 29	2	
USCGC JARVIS (WHEC 725	18	
USCGC KATMAI BAY	5	
USCGC MACKINAW	28	50
USCGC MALLOW (WLB 396)	48	
USCGC MELLON (WHEC 717		8
USCGC MIDGETT (WHEC 72	62	94
USCGC MOBIL BAY	4	
USCGC MUNRO	89	
USCGC NORTHLAND WMEC 9	102	134
USCGC PLANETREE	2	
USCGC POLAR SEA WAGB 1	421	192
USCGC RELIANCE WMEC 61	64	32
USCGC SEDGE (WLB 402)	4	15
USCGC SPENCER	14	
USCGC STEADFAST WMEC 6	66	123
USCGC STORIS (WMEC 38)	2	
USCGC SUNDEW (WLB 404)	8	22
USCGC TAHOMA	25	
USCGC TAMAROA (WMEC 16	8	
USCGC TAMPA WMEC 902		21
USCGC VALIANT (WMEC 62	2	142
USCGC VIGOROUS WMEC 62	41	
USCGC YOCONA (WMEC 168		2
USNS ALTAIR	7	68
USNS APACHE (T-ATF 172	54	125
USNS BARTLETT(T-AGOR 1	1	188
USNS CAPELLA	20	
USNS CHAUVENET TAGS 29	20	32
USNS DE STEIGUER	19	
USNS DEMENOLA	22	
USNS GUS W. DARNELL	50	56
USNS HENRY J. KAISER		92
USNS JOSHUA HUMPREYS	2	25
USNS LYNCH T-AGOR 7		104
USNS MERCURY	69	32
USNS MISSISSINEWA		115
USNS MOHAWK (T-ATF 170	71	
USNS NARRAGANSETT	59	33
USNS NAVAJO	1	
USNS PAMCATUCK TAO-108		222
USNS PECOS	20	29
USNS POLLUX	4	
USNS REGULUS	1	
USNS SATURN T-AFS-10		46
USNS SEALIFT ANTARCTIC	30	18
USNS SEALIFT ARABIAN S	20	
USNS SEALIFT ARCTIC	25	
USNS SEALIFT ATLANTIC	130	171
USNS SEALIFT CARIBBEAN	15	106
USNS SEALIFT CHINA SEA	49	
USNS SEALIFT IND'N OCE	18	
USNS SEALIFT MED	68	52
USNS SIOUX	9	12
USNS VANGUARD TAG 194	111	
USNS WILKES T-AGS-33	13	
VALLEY FORGE	3	81
VAN TRADER	39	47
VIKING ACE	88	103
VISHVA PRAFULLA	2	
VISHVA SIDDHI	5	
WASHINGTON RAINBOW #2	44	183
WESTWARD VENTURE	193	265
WESTWOOD ANETTE	40	
WESTWOOD BELINDA	9	6
WESTWOOD CLEO	92	73
WESTWOOD MARIANNE	122	172
WESTWOOD MUSKETEER		22
WHITE ROSE	33	5
WILFRED SYKES	30	60
WILLIAM E. MUSSMAN	2	
WILLIAM J. DELANCEY	312	
WINDWARD SENTRY	17	77
WOLVERINE	9	
WORLD WING #2	17	7
YAMATAKA MARU	70	
YANKEE CLIPPER	74	
YOUNG SCOPE	62	
YOUNG SKIPPER	3	18
YOUNG SPROUT	69	64
ZEELANDIA	86	
ZIM GENOVA	47	
ZIM HAIFA	47	
ZIM HONGKONG	79	
ZIM HOUSTON	55	
ZIM IBERIA	33	
ZIM KEELUNG	87	
ZIM MARSEILLES	50	
ZIM MIAMI	41	
ZIM NEW YORK	29	
ZIM SAVANNAH	25	
ZIM TOKYO	57	

Summary of U.S. VOS Weather Reports

GRAND TOTAL VIA RADIO 55611
GRAND TOTAL VIA MAIL 52531
TOTAL UNIQUE OBS 85095
TOTAL DUPLICATES 23047 (27.1%)
UNIQUE RADIO OBS.32564 (38.3%)
UNIQUE MAIL OBS. 29484 (34.6%)

Top Ships

Radio

Kaye E. Barker
NOAA Ship Discoverer
USCGC Polar Sea

Mail

Edgar B. Speer
NOAA Ship Cromwell
Arctic Discoverer

July, August, and September 1990

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
ARGO	10	10	0	***
A3BE	104	104	0	COLUMBUS CANADA
A3BZ	160	160	0	ACT 12
A8VI	20	20	0	PACDUCHESS
BIDE	9	9	0	***
BNPC	16	16	0	***
BNTB	15	15	0	R.V.14
CBVM	12	12	0	VINA DEL MAR
CGBV	27	0	27	DAWSON
CGDG	3	3	0	HUDSON
CGDV	168	168	0	W. TEMPLEMAN
CG2680	2	2	0	MARINUS
CG2683	115	115	0	ALFRED NEEDLER
CG2965	83	83	0	RICKER
C6HL	97	97	0	LAZY JEAN
DAKE	97	97	0	KOELN ATLANTIC
DA9100	154	154	0	NORDSEE
DESI	74	32	42	VALDIVIA
DGLM	66	66	0	MONTE ROSA
DGVK	40	40	0	COLUMBUS VICTORIA
DGZV	46	46	0	COLUMBUS VIRGINIA
DHCW	25	25	0	COLUMBUS WELLINGTON
DHOU	30	30	0	PURITAN
DLEZ	23	23	0	YANKEE CLIPPER
DPIB	19	19	0	ICEBIRD
D5NZ	94	94	0	POLYNESIA
EFEL	4	4	0	***
ELBX3	54	54	0	PACKING
ELED7	56	56	0	PACPRINCE
ELED8	23	23	0	PACPRINCESS
ELEH4	34	34	0	C R POINTE NOIRE
ELHL6	65	65	0	COLUMBUS OHIO
ELJP6	5	5	0	CALIFORNIA HERMES
ELJP8	8	8	0	***
EREA	33	32	1	MUSSON
EREB	136	118	18	VOLNA
EREH	106	32	74	PRIBOY
EREI	124	2	122	OKEAN
ERES	77	69	8	VICTOR BUGAEN
ERET	197	195	2	GEORGE OUSHAKOV
EREU	22	22	0	ERNST KRENKEL
ESGG	66	3	63	VYACHESLAV FROLOV
FASU	2	2	0	SUFFREN
FNCZ	70	70	0	LIBREVILLE
FNGS	102	102	0	LA FAYETTE
FNIB	21	21	0	THALASSA
FNJT	24	24	0	KORRIGAN
FNOM	41	41	0	ANGO
FNQB	90	90	0	ILE MAURICE
FNQD	32	32	0	ILE EDLA REUION
FNQM	31	31	0	VILLE DE MARSEILLE
FNZB	9	9	0	SAINT ROLAND
FNZO	74	74	0	RABELAIS
FNZP	51	51	0	RACINE
FNZQ	53	53	0	RIMBAUD
FOUR	2	2	0	OCEANOUNIT FOUR
FPYO	19	19	0	CAP SAINT PAUL
FWQP	19	19	0	A. NIZERY
GOVL	30	30	0	ACT4
GOVN	54	54	0	ACT 6
GPHH	46	46	0	FARNELLA
GQEK	48	48	0	FORTHBANK
GTIA	8	8	0	IVYBANK
GVUJ	1	1	0	EXETER
GYRW	38	38	0	ENCOUNTER BAY
GYSA	35	35	0	FLINDERS BAY
GYSE	28	28	0	NEDLLOYD TASMAN
GYSJ	2	2	0	***
GZKA	51	51	0	ACT 3
HOQT	77	77	0	***
HOUT	7	7	0	***
HPAN	14	14	0	MICRONESIAN COMMERCE
HPEW	74	74	0	PACIFIC ISLANDER
HPYZ	16	16	0	***
H8CB	73	73	0	TILLY
H9BQ	12	12	0	MICRONESIAN INDEPENDENCE
JBOA	61	61	0	KEIFU MARU
JBRR	18	18	0	JAPAN TUNA II
JCCX	81	81	0	CHOFU MARU
JCDF	28	28	0	SOYO MARU
JCDT	4	4	0	AMERICA MARU
JCOD	54	54	0	SHOYO
JDRD	3	3	0	SHOYO MARU
JDWX	60	60	0	KOFU MARU
JFDG	133	133	0	SHUMPU MARU

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
JGDW	22	22	0	KEITEN MARU
JGZK	82	82	0	RYOFU MARU
JITV	257	257	0	CANBERRA MARU
JJZC	23	23	0	HAKONE MARU
JPVB	122	122	0	SEIFU MARU
JQNY	15	15	0	ZUIRYU MARU
J8FO	48	48	0	ROSEBANK
KGWU	15	15	0	TH. WASHINGTON
KIRH	45	45	0	SEA-LAND TRADER
KNBD	86	86	0	DELAWARE II
KNFG	15	15	0	SEA WOLF
KNGB	73	73	0	SEA-LAND ENTERPRISE
KVWA	31	31	0	TEXAS CLIPPER
NAEE	5	5	0	DE STEIGUER
NBKW	1	1	0	INGERSOLL
NBMO	1	1	0	MISSOURI
NGDF	32	32	0	MUNRO
NHDB	27	27	0	TRUETT
NICB	2	2	0	***
NIKA	6	6	0	SEALIFT ATLANTIC
NMEL	10	10	0	MELLON
NMMJ	1	1	0	SHERMAN
NNAS	3	3	0	ESCANABA
NQST	12	12	0	SEALIFT ARCTIC
NRAR	17	17	0	MONTEREY
NRCB	6	6	0	EAGLE
NRUO	99	99	0	POLAR SEA
NSBR	2	2	0	SAMUEL ROBERTS
NSHE	4	4	0	SHERMAN
NYGG	61	61	0	CHAUVENET
OWEQ2	18	18	0	MCKINNEY MAERSK
OWUO6	118	118	0	MOANA PACIFIC COBENHAVN
OXMD2	47	47	0	LARS MAERSK
PGDG	50	50	0	NEDLLOYD KINGSTON
PGDI	83	83	0	NEDLLOYD MANILA
PGDT	63	63	0	NEDLLOYD BALTIMORE
PGEH	31	31	0	NEDLLOYD BAHRAIN
PGEM	43	43	0	NEDLLOYD BARCELONA
PJYG	116	116	0	OLEANDER
RGO	2	2	0	***
SHIP	688	688	0	***
S6FK	101	101	0	SWAN REEFER
UBNZ	66	63	3	SHULEYKIN AKADEMIK
UEAK	80	2	78	VALERIAN URYVAYEV
UFJN	1	1	0	VILNYUS
UFYN	17	0	17	KAPITAN SHAYTANOV
UHQS	176	0	176	AKADEMIK KOROLEV
UINF	45	43	2	GLADIMIR PARSHIN
UJFO	75	64	11	MULTANOVSKIY PROF
UMAY	95	1	94	AKADEMIK SHIRSHOV
UMFW	59	59	0	PROF. ZUBOV
UMWZ	6	6	0	MIRNY
UPIG	26	26	0	***
UPUI	407	215	192	PROFESSOR VIZE
UQHM	140	4	136	ADAMANLES
URJP	6	6	0	EFIM KRIVOCHEEU
UUPB	134	8	126	AKADEMIK N. SHOKALSKIY
UUQR	3	3	0	MOLCHANOV PAVEL PRO
UVMM	174	164	10	GAKKEL, YAKOV
UWEC	16	6	10	PROFESSOR KHROMOV
UZGH	84	72	12	PASSAT
VCTF	13	13	0	CAPE BRIER
VJBQ	14	14	0	ANRO AUSTRALIA
VJJF	8	8	0	FRANKLIN
VKCK	8	8	0	STUART
VKCV	13	13	0	DERWENT
VKLA	28	28	0	ADELAIDE
VKLC	27	27	0	BRISBANE
VKML	121	121	0	SYDNEY
VKMN	47	47	0	PARRAMATTA
VKPM	11	11	0	MORESBY
VMAP	82	82	0	AUSTRALIAN PROGRESS
VP47	1	1	0	AIRCRAFT SQUADRON
VXN8	72	72	0	AIRCRAFT
WCGN	58	58	0	CHEVRON CALIFORNIA
WLDZ	6	6	0	***
WPKD	71	71	0	SEA-LAND ACHIEVER
WRBA	3	3	0	PACMISRANFAC HAWAREA
WRBB	8	8	0	***
WSD3628	37	37	0	ROYAL DAWN
WSRL	8	8	0	SEA-LAND PACIFIC
WTDF	18	18	0	T. CROMWELL
WTDK	141	141	0	D.S. JORDAN
WTDM	36	36	0	M. FREEMAN
WTDO	104	104	0	OREGON II

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
WTEA	63	63	0	DISCOVERER
WTED	40	40	0	CHAPMAN
WTEF	4	4	0	RAINIER
WTEG	4	4	0	MOUNT MITCHELL
WTEJ	173	173	0	MCARTHUR
WTEK	52	52	0	DAVIDSON
WTER	80	80	0	M. BALDRIDGE
WTES	57	57	0	SURVEYOR
WTEW	30	30	0	WHITING
WTEZ	2	2	0	FERREL
WUS9293	59	59	0	***
WXBR	40	40	0	CHEVRON MISSISSIPPI
WXQ7334	17	17	0	PETER ANDERSON
WYR4481	21	21	0	W.J. DELANCY
ZCKP	8	8	0	STAR HONGKONG
ZCSK	19	19	0	SKEENA
ZCSL	67	67	0	NIMOS

CALL SIGN	TOTAL	BATHY	TESAC	SHIP NAME
ZMCR	3	3	0	CANTERBURY
3BBA	2	2	0	MAURITIUS
3DTF	18	18	0	SOUTHLAND STAR
3EBD	73	73	0	***
3EET4	53	53	0	SEAS EIFFEL
7JOB	78	78	0	SHIN KASHU MARU
7KDD	15	15	0	YOKO MARU
9VBZ	1	1	0	MANSURI
9VUU	14	14	0	ANRO ASIA

TOTAL BATHYS	RECEIVED	9012
TOTAL TESACS	RECEIVED	1224
TOTAL REPORTS	RECEIVED	10236

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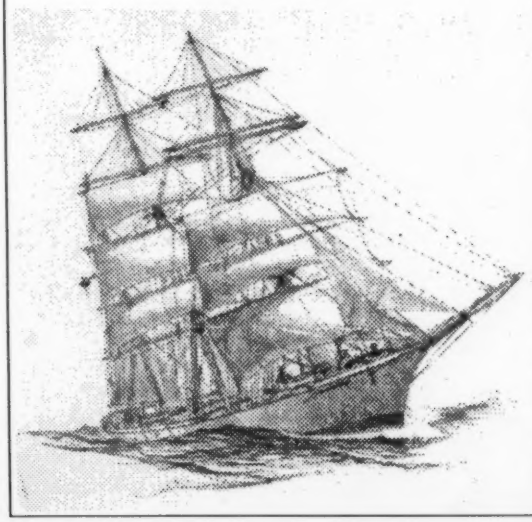
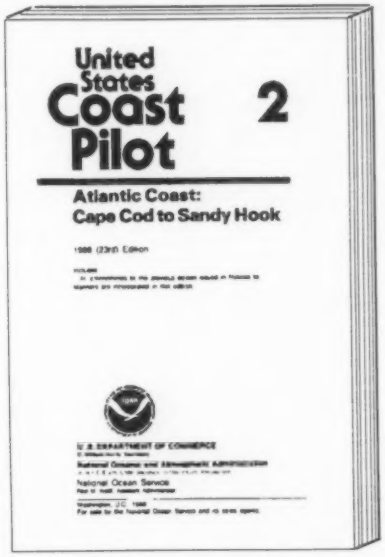




The National Ocean Service Coast Pilot is a series of nine nautical books designed to supplement the navigational information shown on the NOS nautical charts. Subjects include:

- weather, currents, tides, and ice
- channel descriptions and anchorages
- bridge and cable clearances
- wharf descriptions, routes, and dangers
- traffic separation schemes
- prominent features and towage
- small craft facilities

for more information contact:

Distribution Branch (N/CG33)
National Ocean Service
Riverdale, MD 20737-1199

July, August, and September 1990

Wave observations are taken each hour during a 20–minute averaging period, with a sample taken every 0.67 seconds. The significant wave height is defined as the average height of the highest one–third of the waves during the hourly averaging period. The maximum significant wave height is the highest of those values for that month. At most stations, air temperature, water temperature, wind speed and direction are sampled once per second during an 8.0–minute averaging period each hour (moored buoys) and a 2.0–minute averaging period for fixed stations (C–MAN). Contact NDBC Data Systems Division, Bldg 1100, SSC, Mississippi 39529 or phone (601) 688–2838 for more details.

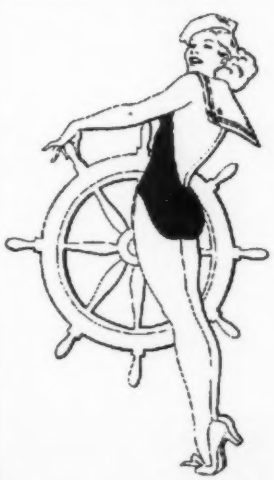
JULY 1990

	LAT	LONG	OBS	MEAN AIR TP (C)	MEAN SEA TP (C)	MEAN SIG WAVE HT (M)	MAX SIG WAVE HT (M)	MAX SIG WAVE HT (DA/HR)	SCALAR MEAN WIND SPEED (KNOTS)	PREV WIND (DIR)	MAX WIND (KN)	MAX WIND (DA/HR)	MEAN PRESS (MB)
BUOY													
41001	34.9N	073.0W	0741	25.7	26.3	1.5	4.2	29/13	12.6	SW	37.3	02/04	1017.5
41002	32.3N	075.2W	0743	26.8		1.4	4.3	29/16	10.5	SW	22.5	15/07	1019.0
41006	29.3N	077.4W	0742	27.5	28.3	1.2	2.8	28/03	9.4	S	22.7	15/01	1017.8
41008	30.7N	081.1W	0741	27.1	27.5	0.9	2.2	28/18	9.8	S	24.9	14/20	1017.4
41009	28.5N	080.2W	1484	27.1	27.4	0.8	2.1	29/03	8.6	SE	23.7	13/23	1017.6
41010	28.9N	078.5W	1479	27.5	28.1	1.0	2.2	28/15	9.9	SE	29.1	02/23	1017.7
42001	25.9N	089.7W	0330	27.7	28.5	0.6	1.2	01/00	8.4	E	22.2	30/15	1016.3
42002	26.0N	093.5W	0743	28.2	29.4	0.7	1.7	17/06	8.9	SE	22.3	13/19	1016.7
42003	25.9N	085.9W	0741	27.9	29.0	0.6	2.0	14/18	8.0	E	19.6	03/21	1017.8
42007	30.1N	088.8W	0742	28.1	29.6	0.4	1.1	05/07	9.3	S	24.3	03/16	1017.0
42015	30.2N	088.2W	0742	27.9	29.2	0.4	1.3	05/12	8.3	S	17.3	04/10	1017.6
42016	30.2N	088.1W	0109	29.2	30.1	0.2	0.5	27/21	7.0	NE	15.0	31/12	1014.9
42019	27.9N	095.0W	0743	28.1	28.8	0.8	2.3	16/17	8.5	SE	24.1	07/00	1016.4
42020	27.0N	096.5W	0742	28.1	28.5	0.9	2.4	16/20	10.4	SE	23.7	07/00	1015.6
44004	38.5N	070.6W	0391	22.3	21.9	1.4	2.7	05/09					1016.4
44005	42.7N	068.6W	0739	17.3	16.6	0.9	2.8	31/16	9.4	SW	22.3	09/15	1015.6
44007	43.5N	070.1W	0738	17.7	15.9	0.5	2.2	31/20	8.4	SW	20.4	20/20	1015.2
44008	40.5N	069.5W	0739	17.7	15.1	1.1	4.1	31/10	12.3	SW	27.0	05/00	1016.9
44009	38.5N	074.6W	0738	23.6	23.4	0.9	2.0	13/16					1017.1
44011	41.1N	066.6W	0738	16.9	15.3	1.4	5.5	31/18	9.7	SW	30.3	02/21	1015.8
44013	42.4N	070.8W	0737	19.9	17.1	0.3	1.5	31/22	8.8	SW	25.5	21/01	1016.2
45001	48.0N	087.7W	0737	6.4	3.7	0.3	1.3	08/15	6.9	SE	20.0	08/13	1016.6
45002	45.3N	086.4W	0739	15.8	14.0				9.2	SW	20.9	08/11	1017.4
45003	45.3N	082.7W	0738	15.1	13.2				6.9	S	16.5	08/17	1017.4
45004	47.5N	086.5W	0740	8.0	4.2				9.1	W	18.9	08/13	1016.8
45005	41.7N	082.4W	0735	21.4	21.6	0.6	2.6	12/19	9.4	SW	25.6	12/19	1016.8
45006	47.3N	089.9W	0739	10.8	7.8	0.3	0.7	08/14	6.6	SW	18.7	17/14	1016.2
45007	42.7N	087.1W	0737	17.8	16.8	0.5	2.3	30/23	8.8	N	25.6	30/21	1016.6
45008	44.3N	082.4W	0739	16.7	14.7	0.6	1.9	12/16	7.1	N	21.1	18/20	1018.5
46001	56.3N	148.3W	0311	11.8	13.1	1.5	2.8	27/12	12.9	S	21.4	27/18	1017.5
46002	42.5N	130.4W	0739	15.3	15.8	1.8	3.7	15/17	12.0	N	21.4	14/17	1021.3
46003	51.9N	155.9W	0738	8.8	8.8	1.9	5.3	13/00	13.0	SW	31.1	12/21	1013.1
46005	46.1N	131.0W	0246	15.1	15.7	1.5	3.0	15/12	10.5	N	20.3	03/03	1022.5
46006	40.8N	137.7W	0738	16.3	17.1	1.3	3.0	04/07	9.2	NE	20.4	05/14	1023.7
46010	46.2N	124.2W	0738	14.7	14.6	1.4	2.9	16/02	10.2	N	22.9	08/04	1018.0
46011	34.9N	120.9W	0739	14.5	14.3	1.3	2.9	07/03	9.0	NW	21.6	06/23	1014.7
46012	37.4N	122.7W	0740	14.0	14.0	1.4	2.5	14/13	7.1	NW	18.4	24/16	1015.0
46013	38.2N	123.3W	0738	13.0	12.1	1.6	2.9	15/02	10.6	NW	28.6	07/02	1013.9
46014	39.2N	124.0W	0738	13.2	12.9	1.9	3.6	15/14	9.7	NW	23.8	23/10	1014.5
46022	40.8N	124.5W	0110	14.0	12.9	1.7	2.7	08/12	9.7	N	20.9	05/00	1016.4
46023	34.3N	120.7W	0737	14.7	15.4	1.6	2.8	07/11	15.8	NW	26.0	24/08	1013.4
46025	33.7N	119.1W	0739	19.4	21.0	1.0	1.9	06/07	5.7	NW	17.1	06/00	1013.7
46026	37.8N	122.7W	0119	12.6	12.0	1.1	1.8	03/06	10.6	W	22.5	02/10	1015.4
46027	41.8N	124.4W	0727	12.4	12.2	1.9	4.0	14/01					1015.1
46028	35.8N	121.9W	0739	14.6	14.6	1.6	2.9	03/04	11.5	NW	25.1	24/04	1014.9
46030	40.4N	124.5W	0739	12.3	10.8	1.7	3.4	15/04	10.5	N	22.0	05/14	1015.1
46035	57.0N	177.7W	0738	8.1		1.4	4.8	21/17	12.9	W	29.9	25/22	1008.5
46040	44.8N	124.3W	0736	13.5	12.5	1.6	3.4	16/03	9.3	N	22.0	09/06	1017.9
46041	47.4N	124.5W	0738	13.8	13.8	1.4	3.4	16/13	7.7	NW	20.0	09/01	1017.9
46042	36.8N	122.4W	0740	14.1	14.2	1.5	2.7	14/21	8.9	NW	23.7	03/00	1015.2
51001	23.4N	162.3W	0740	25.0	25.7	1.8	3.0	02/08	12.9	E	21.1	01/20	1017.9
51003	19.2N	160.8W	0736	25.9	26.5	1.8	2.7	03/12	11.3	NE	20.6	28/14	1015.0
51004	17.5N	152.6W	0733	25.4	26.0	2.0	3.2	01/16	14.1	E	21.7	01/21	1015.4
C-MAN													
ALSN6	40.5N	073.8W	0738	22.4	21.2	0.8	2.2	31/16	13.7	SW	27.8	15/23	1016.7
BURL1	28.9N	089.4W	0740	28.0					8.4	SE	27.6	05/15	1016.4
BUZM3	41.4N	071.0W	0737	19.5					13.1	SW	32.6	04/21	1016.3
CARO3	43.3N	124.4W	0741	12.9					8.1	NE	28.3	05/02	1017.7
CHLV2	36.9N	075.7W	0739	24.9	24.2	0.8	1.8	27/01	11.8	SW	27.8	01/23	1017.8
CLKN7	34.6N	076.5W	0739	26.7					11.1	SW	21.3	14/10	1018.2
CSBF1	29.7N	085.4W	0741	27.7					7.3	W	22.3	13/22	1017.6
DBLN6	42.5N	079.4W	0738	21.0					8.4	SW	32.5	04/17	1018.6
DESW1	47.7N	124.5W	0740	14.0					8.4	W	27.2	11/01	1018.5
DISW3	47.1N	090.7W	0737	17.4					8.0	SW	22.9	17/13	1017.1
DPIA1	30.3N	088.1W	0724	27.7	29.5				8.2	S	23.7	12/19	1017.0
DSLN7	35.2N	075.3W	0739	26.1	26.9	1.1	3.1	29/13	14.8	SW	28.0	27/15	1017.7
ENIP2	11.4N	162.4E	0731	27.8					9.9	E	22.1	14/21	1009.3
FARP2	8.6N	144.6E	0329	27.0					7.9	W	22.9	03/22	1009.6

	LAT	LONG	OBS	MEAN AIR TP (C)	MEAN SEA TP (C)	MEAN SIG WAVE HT (M)	MAX SIG WAVE HT (M)	MAX SIG WAVE HT (DA/HR)	SCALAR MEAN WIND SPEED (KNOTS)	PREV WIND (DIR)	MAX WIND (KN)	MAX WIND (DA/HR)	MEAN PRESS (MB)
FBIS1	32.7N	079.9W	0738	27.7					11.0	SW	26.6	14/20	1017.5
FFIA2	57.3N	133.6W	0741	14.2					6.1	S	29.3	10/18	1019.4
FPSN7	33.5N	077.6W	0740	26.8					13.5	SW	39.5	02/01	1017.9
GBCL1	27.8N	093.1W	0623	27.7	29.5	0.6	1.7	16/18	8.8	SE	26.4	18/19	1017.3
GDIL1	29.3N	090.0W	0741	28.5					7.2	SE	16.8	16/11	1016.9
GLLN6	43.9N	076.4W	0737	20.4					9.0	SW	31.5	20/07	1015.8
IOSN3	43.0N	070.6W	0739	19.7					10.8	SW	27.6	09/03	1016.4
LKWF1	26.6N	080.0W	0739	27.3	28.8				8.6	SE	20.5	19/09	1017.5
MDRM1	44.0N	068.1W	0739	14.3					11.7	SW	28.0	04/15	1015.3
MISM1	43.8N	068.9W	0736	15.4					11.3	SW	26.0	20/21	1015.7
MLRF1	25.0N	080.4W	0736	28.3	29.4				8.7	SE	19.4	11/01	1018.0
MPCL1	29.4N	088.6W	0672	27.9	29.3	0.5	1.0	27/10	8.6	SE	27.4	13/10	1016.7
NWPO3	44.6N	124.1W	0741	13.0					8.3	N	29.0	16/00	1016.9
PAGP2	18.1N	145.8E	0612	28.5					4.9	E	16.3	25/06	1008.1
PILM4	48.2N	088.4W	0738	10.3					8.8	SW	24.2	08/12	1017.5
PTAC1	39.0N	123.7W	0741	12.5					8.0	N	23.4	15/19	1015.1
PTAT2	27.8N	097.1W	0741	28.0	29.1				12.8	SE	25.0	17/02	1015.6
PTGC1	34.6N	120.7W	0741	14.1					16.0	N	26.8	05/14	1014.2
ROAM4	47.9N	089.3W	0328	10.9					10.9	W	30.0	09/15	1015.9
SAUF1	29.9N	081.3W	0738	26.3	27.4				9.2	S	25.2	27/18	1017.4
SBIO1	41.6N	082.8W	0737	22.0					8.3	E	27.6	04/11	1016.2
AUGUST	**1990**												
BUOY													
41001	34.9N	073.0W	0744	25.9	26.8	1.0	2.4	01/01	8.2	SW	21.2	30/18	1017.2
41002	32.3N	075.2W	0744	26.9		0.9	2.0	01/04	7.9	SW	19.7	24/07	1017.9
41006	29.3N	077.4W	0744	27.7	28.8	0.9	1.8	30/14	7.2	SW	18.8	17/16	1017.5
41008	30.7N	081.1W	0744	27.7	28.9	0.5	1.2	31/03	7.5	SW	26.8	03/04	1016.8
41009	28.5N	080.2W	1488	28.0	29.2	0.5	1.3	01/02	7.1	SE	21.2	09/21	1017.0
41010	28.9N	078.5W	1488	27.9	28.9	0.8	1.7	30/22	6.9	S	26.8	10/16	1017.2
42001	25.9N	089.7W	0637	28.7	29.8	0.4	1.1	07/01	6.2	E	22.0	26/15	1017.2
42002	26.0N	093.5W	0743	28.7	29.8	0.5	2.1	07/11	7.4	SE	17.5	31/23	1016.8
42003	25.9N	085.9W	0744	28.8	30.0	0.3	1.3	25/21	6.1	E	21.0	25/19	1017.6
42007	30.1N	088.8W	0744	28.8	30.4				8.7	W	25.3	06/06	1016.4
42015	30.2N	088.2W	0744	28.6	29.8	0.3	1.1	07/13	7.4	SW	26.8	30/22	1016.8
42016	30.2N	088.1W	0699	28.7	29.8	0.3	1.1	30/22	7.4	W	24.5	30/22	1016.0
42019	27.9N	095.0W	0743	28.8	29.5	0.6	2.3	08/19	7.8	S	15.2	07/13	1016.6
42020	27.0N	096.5W	0744	28.8	29.2	0.8	2.7	08/11	10.2	SE	18.1	27/22	1016.1
44004	38.5N	070.6W	0726	25.3	26.2	1.1	3.3	21/21	8.9	SW	25.8	22/00	1017.0
44005	42.7N	068.6W	0743	19.7	19.5	0.8	2.8	01/00	9.3	SW	22.2	19/13	1016.9
44007	43.5N	070.1W	0740	19.1	17.8	0.5	2.3	01/05	7.6	S	21.0	14/05	1016.7
44008	40.5N	069.5W	0742	21.4	20.6	0.9	3.2	20/21	9.3	SW	30.1	20/20	1017.8
44009	38.5N	074.6W	0744	23.9	24.3	0.8	3.0	21/07	9.6	NE	29.7	21/09	1017.0
44011	41.1N	066.6W	0742	21.7	22.2	1.1	4.4	01/02	9.6	W	24.3	01/09	1016.6
44013	42.4N	070.8W	0743	20.7	19.4	0.4	1.9	19/15	6.5	SE	18.1	14/06	1017.4
45001	48.0N	087.7W	0742	10.0	7.6	0.4	1.4	18/14	7.6	SW	20.8	18/13	1017.1
45002	45.3N	086.4W	0744	17.8	17.6	0.6	2.2	19/04	10.5	SW	26.3	19/04	1018.0
45003	45.3N	082.7W	0743	18.1	17.5	0.6	2.3	19/08	7.4	S	21.0	19/10	1018.1
45004	47.5N	086.5W	0744	11.2	7.5	0.3	1.7	19/09	9.5	S	21.5	08/11	1017.3
45005	41.7N	082.4W	0743	21.8	23.3	0.5	2.2	19/23	8.3	E	21.4	19/23	1017.6
45006	47.3N	089.9W	0744	15.9	14.9	0.6	2.8	18/17	8.8	SW	28.8	26/10	1016.5
45007	42.7N	087.1W	0734	20.2	20.3	0.5	2.2	05/22	9.1	S	21.8	05/18	1017.3
45008	44.3N	082.4W	0744	19.5	18.8	0.6	2.5	19/13	7.8	S	22.1	19/05	1019.2
46001	56.3N	148.3W	0744	12.4	12.9	1.8	3.8	11/13	13.1	W	26.6	19/12	1012.8
46002	42.5N	130.4W	0742	17.6	18.2	1.7	4.2	26/18	7.1	W	13.8	30/22	1018.6
46003	51.9N	155.9W	0743	10.7	10.5	1.8	4.3	23/03	12.5	W	24.7	23/04	1016.5
46005	46.1N	131.0W	0128	17.8	18.2	1.6	3.4	13/15	9.4	SW	20.2	13/09	1019.5
46006	40.8N	137.7W	0738	18.3	19.2	1.7	4.5	26/06	12.4	NW	28.8	26/01	1020.7
46010	46.2N	124.2W	0667	15.4	15.1	1.2	2.2	23/15	9.4	N	23.1	08/13	1017.7
46011	34.9N	120.9W	0743	16.0	16.1	1.3	2.4	17/12	9.4	NW	23.0	17/23	1015.8
46012	37.4N	122.7W	0743	15.0	15.2	1.3	2.6	24/12	8.3	NW	18.8	26/18	1015.9
46013	38.2N	123.3W	0743	13.7	13.2	1.4	2.6	06/15	11.1	NW	31.0	14/01	1014.9
46014	39.2N	124.0W	0714	13.6	12.9	1.7	3.9	24/03	8.7	NW	24.9	24/05	1015.4
46023	34.3N	120.7W	0743	16.2	16.8	1.6	2.6	28/08	14.3	NW	26.0	13/07	1014.6
46025	33.7N	119.1W	0741	19.1	20.5	0.9	1.6	26/05	6.1	NW	16.3	06/14	1014.8
46027	41.8N	124.4W	0731	12.4	12.0	1.5	3.6	01/00					1016.0
46028	35.8N	121.9W	0743	15.9	15.8	1.6	2.9	13/06	11.2	NW	29.4	13/05	1016.0
46030	40.4N	124.5W	0739	12.8	11.5	1.5	3.7	27/04	11.4	N	24.5	26/23	1015.9
46035	57.0N	177.7W	0741	8.9		1.9	4.8	05/02	15.0	N	31.9	10/07	1004.3
46040	44.8N	124.3W	0743	13.7	13.1	1.3	2.4	27/18	8.3	N	17.9	08/00	1017.8
46041	47.4N	124.5W	0743	14.6	14.6	1.3	2.7	23/12	7.7	NW	17.3	17/22	1017.3
46042	36.8N	122.4W	0743	15.2	15.6	1.4	2.7	24/10	8.7	NW	23.5	06/01	1016.0
51001	23.4N	162.3W	0744	25.9	26.4	1.7	2.5	27/08	12.4	E	18.5	20/03	1017.5
51003	19.2N	160.8W	0742	26.6	27.3	1.8	2.9	10/01	12.5	NE	21.8	13/21	1014.5
51004	17.5N	152.6W	0736	26.0	26.7	2.0	3.1	24/19	13.7	NE	21.8	12/16	1014.8
C-MAN													
ALSN6	40.5N	073.8W	0744	22.7	22.5	0.7	2.7	20/22	12.6	S	37.4	14/02	1017.3
BURL1	28.9N	089.4W	0743	28.7					6.3	N	27.3	31/01	1016.0
BUZM3	41.4N	071.0W	0744	21.2					12.8	SW	29.2	19/16	1017.2
CARO3	43.3N	124.4W	0743	13.6					7.3	NE	22.0	17/09	1017.8
CHLV2	36.9N	075.7W	0744	25.1	25.9	0.7	1.9	21/09	10.1	SE	38.0	30/00	1018.1
CLKN7	34.6N	076.5W	0743	26.6					7.6	SW	17.4	10/02	1018.0
CSBF1	29.7N	085.4W	0742	28.6					6.6	W	19.7	23/21	1016.8
DBLN6	42.5N	079.4W	0742	20.5					7.3	SW	33.2	29/02	1018.8
DESW1	47.7N	124.5W	0742	14.6					9.2	SW	30.9	04/01	1017.4
DISW3	47.1N	090.7W	0742	18.3					10.1	SW	35.4	26/09	1017.7
DPIA1	30.3N	088.1W	0744	28.5	30.4				7.0	SW	33.1	30/22	1016.3
DSLN7	35.2N	075.3W	0744	26.4	27.6	0.8	2.2	30/11	9.2	SW	29.8	30/09	1017.6
ENIP2	11.4N	162.4E	0734	28.2					9.8	E	22.8	28/04	1009.2
FARP2	8.6N	144.6E	0449	27.2					10.9	SW	34.1	24/16	1009.3
FBIS1	32.7N	079.9W	0744	27.4					7.1	S	18.4	07/20	1017.0
FFIA2	57.3N	133.6W	0740	13.6					7.4	N	25.7	19/22	1015.4
FPSN7	33.5N	077.6W	0744	27.1					8.3	SW	34.4	30/09	1017.5

	LAT	LONG	OBS	MEAN AIR TP (C)	MEAN SEA TP (C)	MEAN SIG WAVE HT (M)	MAX SIG WAVE HT (M)	MAX SIG WAVE HT (DA/HR)	SCALAR MEAN WIND SPEED (KNOTS)	PREV WIND (DIR)	MAX WIND (KN)	MAX WIND (DA/HR)	MEAN PRESS (MB)
GBCL1	27.8N	093.1W	0742	28.2	30.2	0.4	1.3	07/17	7.0	S	25.8	08/14	1017.4
GDIL1	29.3N	090.0W	0741	28.9					6.6	NW	31.6	03/19	1016.6
GLLN6	43.9N	076.4W	0744	21.1					9.6	SW	25.7	05/21	1017.1
IOSN3	43.0N	070.6W	0742	20.4					10.2	SE	26.4	19/10	1017.9
LKWF1	26.6N	080.0W	0743	27.6	29.7				6.8	SE	25.5	24/19	1017.0
MDRM1	44.0N	068.1W	0744	16.7					10.2	SW	25.0	11/22	1017.2
MISM1	43.8N	068.9W	0743	17.0					10.2	S	24.0	19/08	1017.5
MLRF1	25.0N	080.4W	0742	28.7	30.2				6.4	SE	28.6	12/00	1017.6
MPCL1	29.4N	088.6W	0741	28.9	30.5	0.6	1.6	07/13	7.2	W	34.4	30/23	1016.2
NWPO3	44.6N	124.1W	0742	13.7					7.4	N	25.0	07/22	1016.7
PAGP2	18.1N	145.8E	0708	28.0					8.0	E	35.7	18/07	1007.8
PILM4	48.2N	088.4W	0638	14.2					10.6	S	33.8	09/06	1017.2
PTAC1	39.0N	123.7W	0741	13.5					8.3	N	26.0	26/20	1016.0
PTAT2	27.8N	097.1W	0741	28.6	30.0				12.8	SE	24.2	19/06	1015.9
PTGC1	34.6N	120.7W	0742	15.5					13.7	N	29.8	05/07	1015.4
ROAM4	47.9N	089.3W	0743	15.8	13.5				12.1	SW	31.3	18/17	1018.3
SAUF1	29.9N	081.3W	0744	26.3	29.0				6.9	SW	20.1	03/18	1016.8
SBIO1	41.6N	082.8W	0744	21.9					6.8	E	37.8	29/00	1017.1
SGNW3	43.8N	087.7W	0744	19.0					9.5	S	26.4	26/15	1017.7
SISW1	48.3N	122.8W	0740	14.2					6.2	W	29.0	13/03	1017.2
SMKF1	24.6N	081.1W	0740	29.2	30.3				6.6	SE	22.1	12/07	1017.2
SPGF1	26.7N	079.0W	0744	28.5	30.3				3.8	S	16.3	06/16	1016.8
SRST2	29.7N	094.1W	0743	28.3					8.7	S	18.2	31/01	1017.6
STDM4	47.2N	087.2W	0744	15.5					12.0	S	35.1	08/09	1017.5
TPLM2	38.9N	076.4W	0743	23.9	25.6				8.5	S	27.1	14/01	1017.4
TTIW1	48.4N	124.7W	0591	13.8					8.1	S	28.0	12/10	1017.7
UJAP2	8.9N	165.7E	0737	28.0					7.2	E	21.5	31/09	1008.7
VENF1	27.1N	082.5W	0740	27.3	31.0				6.2	E	17.8	23/21	1017.2
WPOW1	47.7N	122.4W	0711	16.5					5.8	NE	20.5	30/13	1016.1
SEPTEMBER 1990													
BUOY													
41001	34.9N	073.0W	0717	24.4	26.3	1.4	3.0	05/04	9.6	N	29.9	15/14	1016.5
41002	32.3N	075.2W	0715	26.1	27.3	1.1	2.0	05/12	8.1	NE	21.3	30/23	1017.1
41006	29.3N	077.4W	0717	27.2	28.8	1.1	2.8	18/17	8.9	NE	22.9	18/14	1016.6
41008	30.7N	081.1W	0718	27.0	28.7	0.8	1.7	24/08	9.1	E	29.1	04/07	1017.0
41009	28.5N	080.2W	1435	27.8	29.2	1.0	2.5	19/03	10.0	E	26.0	16/21	1016.1
41010	28.9N	078.5W	1435	27.5	28.6	1.2	2.5	18/21	9.8	NE	24.5	16/08	1016.4
42001	25.9N	089.7W	0649	28.1	29.6	0.6	1.8	24/03	8.0	E	28.0	28/07	1015.2
42002	25.9N	093.6W	0718	27.9	29.1	0.6	2.2	24/04	8.9	E	27.6	12/15	1014.6
42003	25.9N	085.9W	0718	28.3	29.6	0.5	1.9	24/16	7.9	E	24.5	04/18	1016.0
42007	30.1N	088.8W	0719	27.1	29.0				8.6	SE	24.7	24/02	1016.5
42015	30.2N	088.2W	0606	27.3	29.0	0.4	1.1	24/11	8.4	SE	25.3	11/19	1016.6
42016	30.2N	088.1W	0634	27.3	28.9	0.3	0.9	01/16	7.7	S	23.1	24/08	1016.5
42019	27.9N	095.0W	0718	27.7	29.1	0.7	2.6	23/19	7.9	SE	21.0	23/16	1015.4
42020	27.0N	096.5W	0716	27.7	28.9	0.8	3.0	24/00	9.2	SE	21.4	06/17	1015.0
44001	38.4N	073.6W	0290	19.2	20.6	0.9	1.7	23/10	10.1	NW	23.1	20/03	1016.2
44004	38.5N	070.6W	0718	21.9	23.9	1.4	3.5	08/15	11.2	NE	26.2	20/11	1016.4
44005	42.7N	068.6W	0717	15.8	16.5	1.2	3.5	08/10	10.7	S	29.0	08/10	1016.2
44007	43.5N	070.1W	0718	14.8	15.3	0.8	1.8	24/00	10.2	S	27.2	08/05	1016.3
44008	40.5N	069.5W	0718	18.0	18.7	1.3	3.0	23/08	10.0	NE	28.0	20/10	1017.2
44009	38.5N	074.6W	0717	20.5	21.8	0.9	2.6	08/16	11.0	S	25.6	08/14	1017.0
44011	41.1N	066.6W	0714	18.8	21.5	1.6	3.7	23/09	10.8	NE	31.5	03/17	1015.8
44012	38.8N	074.6W	0558	19.9	21.3	0.8	2.4	08/16	11.1	S	29.0	17/02	1016.2
44013	42.4N	070.8W	0718	16.8	17.4	0.6	2.1	03/23					1016.5
44015	37.1N	073.6W	0265	20.7	22.6	0.8	2.3	20/08	9.3	N	22.7	20/06	1016.2
45001	48.0N	087.7W	0713	10.0	9.7	0.7	2.9	23/03	10.4	S	27.8	23/00	1015.5
45002	45.3N	086.4W	0716	15.7	17.4	0.8	2.4	23/11	11.3	SW	24.8	23/11	1016.1
45003	45.3N	082.7W	0717	14.6	15.7	1.0	3.0	23/04	10.0	S	21.3	23/02	1015.8
45004	47.5N	086.5W	0715	10.7	10.2	0.7	3.8	23/05	10.4	N	25.2	22/22	1015.2
45005	41.7N	082.4W	0718	18.7	21.3	0.6	1.7	16/19	11.0	SW	27.4	07/00	1016.3
45006	47.3N	089.9W	0717	12.9	13.0	0.7	2.4	13/03	10.1	SW	24.5	07/05	1015.3
45007	42.7N	087.1W	0703	18.3	19.6	0.7	2.9	23/08	11.7	S	27.6	23/04	1016.0
45008	44.3N	082.4W	0718	15.9	16.8	1.0	3.3	15/04	9.4	S	19.8	07/16	1017.0
46001	56.3N	148.3W	0719	11.4	11.5	2.9	7.9	27/09	15.9	SW	38.1	27/05	1009.2
46002	42.5N	130.4W	0709	17.6	18.3	1.9	4.2	26/07					1019.8
46003	51.9N	155.9W	0716	11.1	11.0	2.9	8.4	23/20	16.9	SW	30.9	28/22	1007.9
46006	40.8N	137.7W	0718	18.0	18.5	1.8	4.5	25/21	11.2	N	25.5	02/15	1021.3
46010	46.2N	124.2W	0718	15.4	14.5	1.3	3.1	29/21	8.7	N	21.8	14/21	1018.5
46011	34.9N	120.9W	0718	15.5	15.0	1.6	3.6	27/01	11.1	NW	23.7	08/23	1014.8
46012	37.4N	122.7W	0713	15.8	15.9	1.4	2.8	26/07	8.9	NW	20.7	10/00	1015.7
46013	38.2N	123.3W	0715	14.4	12.7	1.6	3.0	20/13	12.6	NW	27.5	02/04	1015.0
46014	39.2N	124.0W	0689	15.6	15.4	1.7	3.8	20/03	10.1	NW	22.4	21/17	1015.6
46022	40.8N	124.5W	0365	15.7	15.2	2.2	4.5	20/05	8.7	N	23.3	21/22	1016.8
46023	34.3N	120.7W	0715	15.9	15.9	1.7	3.2	27/13	16.3	NW	26.4	11/18	1013.5
46025	33.7N	119.1W	0526	19.6	21.3	0.9	1.8	10/00	5.6	W	14.4	25/02	1013.5
46026	37.8N	122.7W	0308	15.1	14.9	1.4	2.9	26/00	8.2	W	21.4	19/02	1015.0
46027	41.8N	124.4W	0705	14.4	14.3	1.5	4.3	20/00	9.8	N	29.5	19/23	1016.6
46028	35.8N	121.9W	0718	16.3	15.6	1.8	3.4	26/09	14.2	NW	27.0	12/04	1015.3
46030	40.4N	124.5W	0471	14.3	14.6	1.6	3.6	20/11	10.9	N	25.8	22/03	1016.0
46035	57.0N	177.7W	0713	7.3	8.5	2.2	5.2	08/14	16.6	N	33.8	08/14	1006.1
46040	44.8N	124.3W	0713	15.1	14.8	1.4	3.5	30/02	9.0	N	22.5	29/22	1018.3
46041	47.4N	124.5W	0701	15.7	16.8	1.3	3.4	30/00	7.4	N	19.6	29/10	1018.8
46042	36.8N	122.4W	0719	15.7	16.0	1.6	3.1	20/10	9.8	NW	22.9	10/02	1015.7
51001	23.4N	162.3W	0715	26.4	27.2	1.9	3.3	25/06	12.8	E	20.7	16/18	1016.5
51003	19.2N	160.8W	0717	26.8	27.7	1.9	3.4	19/02	12.0	NE	21.0	06/11	1013.8
51004	17.5N	152.6W	0717	26.2	26.8	2.3	6.4	18/00	15.1	E	45.0	18/03	1014.1
52009	13.2N	144.5E	0316	27.8	29.0	1.0	1.7	21/04	6.5	SW	16.7	17/15	1010.2
C-MAN													
ALSN6	40.5N	073.8W	0718	19.2	20.7	0.8	1.8	04/06	12.4	S	28.4	20/01	1017.1
BURL1	28.9N	089.4W	0716	27.3					8.5	SE	24.5	23/16	1015.5
BUZM3	41.4N	071.0W	0489	17.8					12.3	N	28.7	08/10	1017.1
CARO3	43.3N	124.4W	0718	14.7					7.0	NE	25.9	14/21	1018.2

	LAT	LONG	OBS	MEAN AIR TP (C)	MEAN SEA TP (C)	MEAN SIG WAVE HT (M)	MAX SIG WAVE HT (M)	MAX SIG WAVE HT (DA/HR)	SCALAR MEAN WIND SPEED (KNOTS)	PREV WIND (DIR)	MAX WIND (KN)	MAX WIND (DA/HR)	MEAN PRESS (MB)
CHLV2	36.9N	075.7W	0718	21.9	24.0	0.9	2.2	09/00	11.9	NE	32.6	26/23	1018.4
CLKN7	34.6N	076.5W	0718	24.2					9.8	NE	30.5	03/22	1018.1
CSBF1	29.7N	085.4W	0533	26.1					5.8	NE	18.3	23/03	1016.9
DBLN6	42.5N	079.4W	0718	17.1					9.9	S	37.3	24/20	1017.8
DESW1	47.7N	124.5W	0717	15.4					7.7	SW	27.7	14/22	1019.0
DISW3	47.1N	090.7W	0718	14.2					11.2	SW	30.3	23/11	1016.6
DPIA1	30.3N	088.1W	0693	26.5	28.4				8.0	N	26.1	24/03	1016.2
DSLN7	35.2N	075.3W	0718	24.1	27.0	1.1	2.2	04/18	13.0	NE	29.7	17/00	1017.6
ENIP2	11.4N	162.4E	0715	27.9					9.5	E	26.7	26/03	1009.6
FARP2	8.6N	144.6E	0614	27.7					7.0	SW	28.3	12/17	1009.5
FBIS1	32.7N	079.9W	0628	25.8					8.9	SW	19.6	24/09	1017.3
FFIA2	57.3N	133.6W	0716	10.7					10.7	SE	41.7	28/17	1017.4
FPSN7	33.5N	077.6W	0718	25.6					11.2	SW	26.8	24/05	1017.7
GBCL1	27.8N	093.1W	0718	27.2	29.6	0.6	2.2	23/17	9.0	SE	31.6	12/18	1016.1
GDIL1	29.3N	090.0W	0718	27.4					6.9	SE	25.9	24/02	1016.2
GLLN6	43.9N	076.4W	0716	16.1					12.4	S	31.0	15/11	1015.2
IOSN3	43.0N	070.6W	0718	15.8					12.4	S	27.0	18/20	1016.9
KOSP2	5.2N	163.0E	0682	26.8					5.2	E	22.0	07/06	1009.0
LKWF1	26.6N	080.0W	0714	27.8	29.4				8.8	E	32.0	28/11	1015.6
MDRM1	44.0N	068.1W	0716	13.4					11.5	SW	33.1	23/05	1016.3
MISM1	43.8N	068.9W	0719	13.7					12.0	S	34.1	23/08	1016.4
MLRF1	25.0N	080.4W	0716	28.5	30.0				8.3	E	29.1	28/05	1016.0
MPCL1	29.4N	088.6W	0705	27.1	29.4	0.8	2.4	29/22	8.3	SE	28.5	03/13	1016.0
NWPO3	44.6N	124.1W	0719	14.5					6.2	N	25.0	30/01	1017.2
PAGP2	18.1N	145.8E	0701	27.8					7.7	E	21.2	14/06	1009.9
PILM4	48.2N	088.4W	0465	9.9					12.4	N	32.3	24/12	1015.1
PTAC1	39.0N	123.7W	0718	14.2					8.4	N	25.4	21/22	1016.2
PTAT2	27.8N	097.1W	0717	27.4	29.2				10.4	SE	26.9	23/15	1015.0
PTGC1	34.6N	120.7W	0719	15.4					16.3	N	27.6	11/07	1014.4
ROAM4	47.9N	089.3W	0716	12.3	12.4				12.8	SW	31.0	22/16	1017.0
SAUF1	29.9N	081.3W	0719	26.5	28.8				9.3	E	20.3	27/20	1016.7
SBIO1	41.6N	082.8W	0717	18.4					10.2	S	33.0	15/04	1015.7
SGNW3	43.8N	087.7W	0718	16.9					11.3	S	35.0	14/11	1016.4
SISW1	48.3N	122.8W	0716	13.1					4.8	W	20.0	23/12	1019.4
SMKF1	24.6N	081.1W	0715	28.6	29.7				8.5	E	27.0	28/05	1015.4
SPGF1	26.7N	079.0W	0718	28.1	29.7				6.8	E	20.1	28/01	1015.3
SRST2	29.7N	094.1W	0718	26.6					7.9	S	23.5	01/14	1016.9
STDM4	47.2N	087.2W	0645	12.0					14.8	N	44.1	22/23	1015.9
SVLS1	32.0N	080.7W	0645	24.8		0.7	1.7	24/12	11.6	E	28.4	24/07	1017.7
TPLM2	38.9N	076.4W	0718	20.4	23.1				9.7	S	23.7	22/07	1017.3
UJAP2	8.9N	165.7E	0714	27.5					7.2	E	21.7	24/22	1009.0
VENF1	27.1N	082.5W	0717	26.5	29.7				6.7	E	26.4	29/21	1015.5
WPOW1	47.7N	122.4W	0675	15.0					4.6	NE	23.9	07/16	1018.1
SGNW3	43.8N	087.7W	0738	18.3					9.6	N	29.0	12/19	1017.0
SISW1	48.3N	122.8W	0741	14.0					7.1	W	29.0	23/03	1017.6
SMKF1	24.6N	081.1W	0736	28.7	29.6				6.7	SE	19.1	27/16	1017.5
SPGF1	26.7N	079.0W	0475	28.2	29.7				4.6	NW	18.7	05/04	1016.2
SRST2	29.7N	094.1W	0741	27.6					8.9	S	28.0	05/10	1017.7
STDM4	47.2N	087.2W	0738	13.6					12.1	S	38.1	18/05	1016.8
TPLM2	38.9N	076.4W	0739	24.8	25.9				9.8	S	31.5	05/23	1016.6
TTIW1	48.4N	124.7W	0741	13.5					8.3	S	24.0	04/11	1018.3
UJAP2	8.9N	165.7E	0729	27.6					6.6	E	21.9	29/12	1008.9
VENF1	27.1N	082.5W	0511	26.3	29.4				7.6	E	23.2	10/22	1015.9
WPOW1	47.7N	122.4W	0708	16.8					5.6	NE	16.0	31/10	1016.4



Wanted !!!

Now that we have your attention. The National Climatic Data Center (NCDC) is beginning a project that will compare various decades and 5–year periods of Ocean Weather data to help determine if there has been a change in the global climate. However, there is a lack of **merchant marine weather observations** during the World War II years. These observations were classified at the time and not transmitted. Most were eventually returned to the shipping companies. NCDC has not had any luck in tracking these records, which may no longer exist. However, if you know where some may still be available please contact:

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